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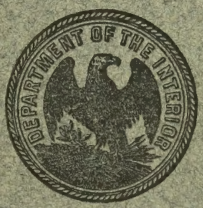
THIRTEENTH ANNUAL REPORT

OF THE

RECLAMATION SERVICE

1913-1914

F. H. NEWELL, DIRECTOR
A. P. DAVIS, CHIEF ENGINEER
WILL R. KING, CHIEF COUNSEL
W. A. RYAN, COMPTROLLER
I. D. O'DONNELL, SUPERVISOR OF IRRIGATION



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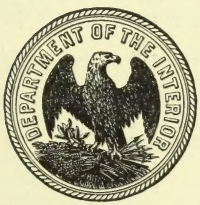

WASHINGTON
GOVERNMENT PRINTING OFFICE
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LETTERS OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
Washington, December 7, 1914.

SIR: In compliance with the provisions of section 2 of the act approved June 17, 1902, entitled "An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," I have the honor to transmit the Thirteenth Annual Report of the Reclamation Service.

Very respectfully,

FRANKLIN K. LANE.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEPARTMENT OF THE INTERIOR,
UNITED STATES RECLAMATION SERVICE,
Washington, D. C., September 12, 1914.

SIR: Transmitted herewith is the Thirteenth Annual Report of the Reclamation Service. This report relates in particular to the work completed and in progress during the fiscal year ended June 30, 1914, but contains also information in regard to previous operations, in order that the methods, progress, and results of reclamation work may be more readily understood.

Very respectfully,

T. H. NEWELL,
Director.

The SECRETARY OF THE INTERIOR.

THIRTEENTH ANNUAL REPORT

OF THE

RECLAMATION SERVICE.

GENERAL DISCUSSION.

HOME MAKING.

Increasing the number of farm homes and extending the area of productive lands in the United States are the objects of the work of the Reclamation Service. This end has been made possible by the act of June 17, 1902, which sets aside the proceeds from the disposal of public lands for the survey, construction, and maintenance of irrigation works for the storage and diversion of waters for arid lands in the Western States. The extent to which such homes and farms have been created in otherwise useless areas testifies to the success of the act. That success has been attained is shown by the fact that during 1913 the crop production on the areas already supplied with water exceeded $15,700,000, and also by the further fact that during the spring of 1914 additional areas of heretofore untilled land were being subdued and brought into productive condition.

In the 12 years which have elapsed since the passage of the act large projects of water storage and distribution have been initiated, the principal works constructed, and water brought out to an extent sufficient to supply over 1,300,000 acres of land. The foundations thus laid and the works thus built are planned with a view to expansion to double this area. As the country develops, as the individual farmers till more land, it is possible with relatively less additional cost to extend or complete the details of construction until nearly 3,000,000 acres have been supplied with water.

IRRIGATOR'S SUCCESS.

On the success of the irrigator depends the success of the irrigation project. Unless the average man is able to make not merely a living but also to accumulate a competence the efforts made in the reclamation of the arid lands can not be considered as successful.

In order that the greatest possible good may be realized from the efforts of the Government and the irrigators, it is necessary that the irrigators appreciate the efforts of the United States to further their interests and that the officials responsible for the administration of the irrigation projects fully understand the needs of the irrigators.

Through cooperation with other Federal departments, which have materially assisted both the Reclamation Service and the irrigators, through the work of especially equipped officials, and through the interest of Members of Congress in the Reclamation Service work much has been done toward unifying the efforts of all interested in the success of the irrigators.

CROPS OF 1913.

There has been general success on the lands irrigated by the Government works. This is shown by the total crop production from 24 projects, on which very nearly 700,000 acres were irrigated in 1913, and crops were harvested from the greater part of this land with a total value of $15,700,000. The total crop production of the year 1913, however, was burdened with charges due the reclamation fund for that fiscal year, amounting to nearly 16 per cent. That is to say, of the $15,700,000 produced, over $2,500,000 was due to the United States under the terms of the reclamation law. The accrued charges for 1913 include water rentals on land as to which no construction charges had been assessed, and also charges against land not under cultivation. To obtain some idea of these large figures, it may be said that these irrigation projects in effect have already added to the producing area of the country the equivalent of a small-sized State. By comparison with the United States census figures for 1910 this cropped area exceeds that of Connecticut, and the total value of the crops raised on the projects during 1913 is greater than those given by that census for some of the smaller States.

The crop yields for 1913 as a whole were good, due largely to the fact that there was an abundant supply of water from most of the systems being built by the Government. Crop prices were maintained fairly well throughout the year and there was generally little difficulty in disposing of the products raised. The value of the crops produced on all of the irrigated farms averaged $24.50 per acre cropped. This amount may appear small when compared with statements that are current regarding the wonderful productive capacity of irrigated lands offered for sale. The statistics ordinarily quoted by sales agents are those derived from the most successful farms only and do not in any way represent a true average. The above figure of $24.50 per acre is the average for all kinds of irrigation and for all kinds of lands to which water has been applied on the Government projects, bringing together not only the results attained by the successful man, who has produced a bountiful living on a few acres, but also those of the man who has attempted to irrigate an area far greater than he could handle and has received back hardly the equivalent of the seed he has sown.

It must be remembered also that for some time to come each year is apt to show better results for the acreage now reported, as the proper preparation of land is generally a progressive process, as it takes time to ascertain what are the best paying crops in any locality, and because the capital employed in farming operations can be gradually increased.

The first attempt at securing crop statistics from the areas irrigated by the Government projects was made in a tentative way for

the year 1910. On the basis of experience then obtained the methods were improved and for 1911 and 1912 more complete data were secured, the results being reproduced in condensed tables and distributed for official use. The importance of the subject, however, justifies the inclusion in the printed annual reports of a discussion of crop production because the success of all reclamation operations is measured by the success of the farmers; crop production is the final test of the economic value of the projects. With increased experience the statistics are now more thoroughly collected, and hence greater dependence can be placed upon them and upon the conclusions drawn from them.

Tabular matter concerning crop production on the separate projects is given in the following pages in connection with the discussion of each project and in the appendix are given summary tables for all projects.

INCREASE OF IRRIGATED AREA.

There were irrigated by the Government projects in 1913 a total of nearly 700,000 acres, an increase of more than 100,000 acres, or nearly 20 per cent, over the area irrigated in 1912. Water delivery was begun by the Reclamation Service in 1906, when relatively small areas were irrigated on the Salt River project, Arizona, Truckee-Carson project, Nevada, and Carlsbad project, New Mexico. The following table shows for each year the area for which the service has been prepared to supply water and the area actually irrigated. The difference is made up by undeveloped private and State lands, public lands not entered, and portions of the irrigated farms that have not been prepared for water and cultivated. This last item is a considerable one. In 1913 the irrigable area of the farms served was 915,243 acres, whereas but 699,183 acres, or only about 75 per cent, were watered.

Acreage irrigable and irrigated on reclamation projects.

Calendar Year.	Acreage irrigable.[1]	Acreage irrigated.
1906	39,300	22,300
1907	266,300	187,628
1908	488,942	289,549
1909	730,601	410,628
1910	917,751	465,103
1911	1,042,609	541,366
1912	1,205,236	588,370
1913	1,255,381	699,183

[1] Area Service was prepared to supply water.

The proportion of lands irrigated as compared with lands for which water was ready was 49 per cent in 1912 and 56 per cent in 1913, which indicates a great development. This percentage is materially affected by the constant additions made to the area irrigable and would rise rapidly if additions were to cease. Much of the percentage increase is due to the relatively small addition to the irrigable lands in 1913.

There is great need, however, for some method of increasing the area actually irrigated and cropped to an amount more nearly equal to that for which the irrigation systems are already built. This is important both from the viewpoint of the Government and of the water user. The quicker the investment made by the Government is put to use the better for all concerned, and the more completely the system is used the less per acre will be the cost of operation and maintenance, the higher the development of the community, the better the means of transportation and markets, and the higher the conditions of civilization.

From the above table the area irrigated in 1913 is seen to be 699,183 acres. About 10 per cent of this was watered for other purposes than obtaining a 1913 crop, such as fall plowing and growing young orchard, so that the cropped area was 642,216 acres.

In the following table the distribution of this cropped area is given by States and projects, together with the irrigable area on the project, also the total crop value and value per acre:

Acreage cropped and irrigable and value of crops, 1913, by projects.

State.	Project or unit.	Acreage.		Crop value.	
		Cropped.	Irrigable.[1]	Total.	Per acre cropped.
Arizona	Salt River	161,642	170,000	$4,552,879	$28.17
Arizona-California	Yuma	16,726	50,000	610,228	36.48
California	Orland	5,987	14,300	203,949	34.07
Colorado	Uncompaghre	30,366	48,000	995,153	32.77
Idaho	Boise	50,865	207,000	830,314	16.32
	Minidoka:				
	Gravity	36,879	115,600	593,105	16.08
	Pumping	29,362		543,347	18.51
Montana	Blackfeet	.....	26,649	.....	.....
	Flathead	4,579	42,400	53,846	11.76
	Fort Peck	410	4,970	1,960	4.78
	Huntley	15,798	28,805	464,697	29.35
	Milk River	2,459	12,800	24,004	9.76
	Sun River	6,807	16,346	105,564	15.51
Montana-North Dakota	Lower Yellowstone	7,410	36,578	101,587	13.71
Nebraska-Wyoming	North Platte	54,306	91,475	786,621	14.40
Nevada	Truckee-Carson	42,943	52,039	555,007	12.92
New Mexico	Carlsbad	12,195	20,261	257,274	21.10
	Hondo	808	1,000	14,236	17.62
New Mexico-Texas	Rio Grande	26,720	27,723	679,271	25.40
North Dakota	North Dakota pumping:				
	Buford-Trenton	.....	4,050	.....	.....
	Williston	1,686	8,047	38,888	23.06
Oregon	Umatilla	3,033	16,652	84,078	27.72
Oregon-California	Klamath	18,928	28,904	288,189	15.22
South Dakota	Bellefourche	32,568	65,868	355,380	10.91
Washington	Okanogan	2,736	10,084	86,438	31.59
	Yakima:				
	Sunnyside	46,230	80,658	2,820,786	61.00
	Tieton	12,595	34,000	422,950	33.60
Wyoming	Shoshone	18,178	41,172	262,464	14.44
Total		642,216	1,255,381	15,732,215	24.50
1912		539,934	1,205,236	13,825,369	25.60

[1] Area Service could supply.

It is to be noted that the highest crop value per acre—$61—is on the Sunnyside unit, where a large part of the land has been in cultivation for many years, indicating the effect of time and experience, although much of the result is due to an exceptional proportion of

very valuable orchards. Disregarding the Fort Peck, an Indian project on which a very small area was watered in its first year, the smallest crop values per acre are on the Milk River project in Montana, the Belle Fourche project in South Dakota, and on other northern projects where the larger portion of the land is in grain.

KINDS AND AREAS OF CROPS.

The Government projects are producing substantial quantities of most of the staple crops of the United States, while showing the characteristic differences that exist between the arid and humid regions. To pay the larger cost of irrigation over that of humid farming and to overcome the less advantageous market facilities there is a progressive tendency toward intensive farming and the production of highly specialized products such as are necessary in any successful irrigation enterprise.

Alfalfa is the basis of success on all the projects, not only holding first place in importance among the forage crops, such as timothy, clover, and others which are of prime importance in the humid East, but forming by far the most important single crop among all those grown on the projects. Clover is, among the hay crops, probably next to alfalfa, but far below it in importance on the projects. Other hays include most of those raised in the humid regions and some native grasses of the Western States.

Among the grains wheat, oats, and barley are of greatest importance. Kafir corn, milo maize, and other sorghum corns, crops which have emigrated from the Old World and found favor in the arid region because of their drought-resisting qualities, are important producers of grain and forage on some of the southern projects. Indian corn, so important in the Middle West, is largely replaced by barley in the arid country.

Substantial areas of fruit are already grown on a number of projects, notably in Arizona, Colorado, and Washington. Apples cover the greatest area of the fruits, which embrace many varieties of citrus and deciduous.

An advance in intensive farming is shown by the increased acreages devoted to vegetables and other crops requiring great care and attention. Potatoes are widely produced and of great importance. Sugar beets have become a highly important crop on a number of projects, and on several cotton has sprung into importance. Other highly specialized crops are developing under the different local conditions of the various projects, which together are already producing most of the crops grown in the United States.

Of the 699,183 acres irrigated in 1913 crops were harvested from 642,216 acres; that is, about 90 per cent of the irrigated area is cropped. The ratio was almost exactly the same in 1912, so that the area cropped in 1913 was about 100,000 acres, or 20 per cent more than that in 1912. The irrigated but uncropped acreage is made up largely of young orchard and of alfalfa planted in the fall for a stand the next spring.

In the following table are shown for the various projects the areas devoted to the several classes of crops, viz, hay, grain, vegetables, fruit, and all others classed together as miscellaneous:

Acreage cropped in 1913.[1]

State.	Project.	Hay.	Grain.	Vegetables.	Fruit.	Other crops.	Total.[2]
Arizona	Salt River	86,930	38,727	4,601	2,428	40,765	161,642
Arizona-California	Yuma	11,306	4,802	318	47	15,376	16,726
California	Orland	5,084	21	71	171	3,555	5,987
Colorado	Uncompahgre	11,133	8,956	5,650	1,833	3,630	30,366
Idaho	Boise	17,359	24,411	1,859	144	6,861	[3] 50,865
	Minidoka:						
	Gravity unit	18,905	10,627	1,736	310	5,542	36,879
	Pumping	8,599	12,682	3,534	19	4,549	29,362
	Total	27,504	23,309	5,270	329	10,091	66,241
Montana	Flathead	467	3,905	85	2	121	4,579
	Fort Peck	360	40	10	.....	.....	410
	Huntley	5,183	5,772	396	.....	4,475	15,798
	Milk River	838	1,612	6	.....	3	2,459
	Sun River	2,090	4,008	213	.....	496	6,807
Montana-North Dakota	Lower Yellowstone	1,557	5,605	69	.....	179	7,410
Nebraska	North Platte	27,298	17,592	1,456	.....	7,960	54,306
Nevada	Truckee-Carson	21,950	3,753	634	.....	19,767	42,943
New Mexico	Carlsbad	7,891	1,601	49	186	7,543	12,195
	Hondo	648	.....	.....	80	80	808
New Mexico-Texas	Rio Grande	19,524	5,379	1,467	423	1,267	26,720
North Dakota	North Dakota pumping.	1,175	411	75	.....	25	1,686
Oregon	Umatilla	2,086	56	145	244	581	3,033
Oregon-California	Klamath	10,349	6,164	299	.....	2,116	18,928
South Dakota	Belle Fourche	9,921	21,332	542	.....	2,632	32,568
Washington	Okanogan	1,456	191	317	924	75	2,736
	Yakima:						
	Sunnyside unit	27,041	4,657	5,351	8,730	2,794	46,230
	Tieton unit	5,099	2,699	4,141	670	849	12,595
Wyoming	Shoshone	11,179	6,019	413	.....	567	18,178
Total	.....	315,428	191,022	33,437	16,211	131,808	642,216
Per cent	.....	49.1	29.8	5.2	2.5	20.5	100

[1] For more detailed tabulation, see appendix.
[2] Corrected for duplicated areas yielding 2 crops.
[3] Includes 1,674 acres unclassified crops.

Alfalfa.—The one crop which is characteristic of irrigated regions and whose area to a certain extent marks the degree of development in the arid country is alfalfa. This is grown on every Government project. On 16 of the 24 projects operated in 1913 it constituted over 50 per cent of the cropped acreage, and on 20 of the projects over one-third of the producing area.

Alfalfa is of value and an indication of progress not only in the production of forage that can be fed on the ground, but even more in its effect on the fertility of the soil, as it forms the most valuable of the green-manure crops. After it has been cut for a few seasons the alfalfa should be turned in, thus enriching the soil and greatly increasing the yields of other crops planted after it in rotation. A panorama of development in the arid regions is one of the gradual spread of a green carpet of alfalfa, which is in turn rolled up, or, rather, rolled under, to be followed by other crops, and then later again spread over the surface.

Alfalfa hay was harvested from 291,245 acres on the various projects in 1913, or 45.4 per cent of the total cropped area. In 1912 the

proportion was 37.1 per cent. The increase is a sign of progress in preparing the surface for irrigation and establishing a stand of alfalfa to secure a profitable crop while adding nitrogen and humus to the soil.

The above acreage from which alfalfa was cut yielded 941,905 tons of hay, or an average of 3.2 tons per acre. This compares very favorably with the average yields given by the 1910 census for the United States, as shown by the following figures:

Average yield of hay.

	Tons per acre.
All hay and forage in United States (1910 census)	1.45
Timothy in United States (1910 census)	1.22
Timothy and clover mixed (1910 census)	1.27
Clover alone (1910 census)	1.29
Alfalfa in United States (1910 census)	2.52
Alfalfa on Reclamation Service projects, 1913	3.2

It is to be noted that the average yield of alfalfa on the Government projects is materially greater than the average for the United States, which in turn is substantially larger than the average yields of other hays. The importance of these figures to the Government projects is seen when it is realized that alfalfa is grown on nearly 50 per cent of the project lands.

Though the most profitable use of alfalfa is by feeding it on the farm, yet it is a good revenue producer when sold. The crop on all the projects in 1913 was valued at an average of $7.02 per ton as used or disposed of by the farmer, or a total value of $6,604,677 for all projects. This was 42 per cent of the total crop value for all projects, and an increase over 1912 of nearly $3,000,000.

On the nearly 300,000 acres from which alfalfa was harvested it gave an average value of $22.65 per acre. A comparison of the value per acre on the different projects and with other crops shows the great adaptability of alfalfa. On only 3 of the 24 projects is its crop value per acre less than $15, which is about 75 per cent of its average value. In comparison with this, for example, is clover which, with an average yield of about $6 less per acre than alfalfa, gives less than 75 per cent of its average on over half of the projects on which it is grown.

These figures support strongly the statement that alfalfa is king of the arid-region crops. It is a crop available for production on large areas, is adapted to all sections of the arid country, and uniformly gives a superior yield in tons or dollars per acre while at the same time improving the soil.

Thus, compared to grain, alfalfa yielded $9 more per acre in 1913, and this difference is considerably increased if the relations to soil fertility are considered. Grains extract the elements of fertility from the soil; alfalfa, a legume, actually increases the supply of nitrogen, the most valuable element, goes deep in the subsoil for other constituents, and is well adapted to adding humus to the newly cultivated lands.

In dollars per acre alfalfa on the reclamation projects shows up very favorably when compared to the hay crops of the country as shown by the 1910 census figures:

Average value of hay per acre.

Timothy alone, all United States (1910 census)	$12.76
Mixed timothy and clover (1910 census)	13.21
Clover alone (1910 census)	11.98
Alfalfa (1910 census)	19.78
Total hay (1910 census)	11.40
Alfalfa on Reclamation Service projects, 1913	22.65

The census figures are based on an average price for alfalfa of $7.85 per ton; the same figure for the reclamation projects is only $7.02, yet the average value on the latter is $22.65 per acre, as against $19.78 for the average for alfalfa in the United States and $11.40 for the average of all hay and forage in the whole country.

Grain.—From 1912 to 1913 the area from which grain was harvested on the projects decreased from 33.9 to 29.8 per cent of the total cropped area, thus indicating a better condition of agriculture, or rather a more advanced stage. Grain is the first or quick money crop of the pioneer, but one the continuation of which is rarely profitable under irrigation; that is, it does not pay as a rule to raise grain under irrigation as the principal or only crop. In rotation with other crops, especially as a revenue producer in the first stage of developing the raw land, it is useful and valuable; but while a grain crop may be raised with a minimum of labor and time before the surface has been well prepared for irrigation, if continuously planted it tends rapidly to impoverish the farm. Grain is frequently used as a nurse crop for young alfalfa, and thus there may be duplication of cropped areas as the grain crop may be cut, to be followed later in the season by a cutting of alfalfa from the same lands.

Grain was harvested from 191,022 acres on all projects during 1913, producing a crop of over four and one-half million bushels, or an average of 25 bushels per acre, including flax. At an average price of 57 cents per bushel this crop was worth $2,658,032, or $13.90 per acre. The highest average values per acre among the grains are given by barley and corn.

These figures in connection with those for alfalfa, brought together below, show the superiority of alfalfa over grain, even neglecting the great advantages of alfalfa in relation to the fertility and physical condition of the soil.

Comparison of alfalfa and grain on reclamation projects.

	Alfalfa.	Grain.
Cropped area, acres	291,245	191,022
Crop value	$6,604,677	$2,658,032
Per cent of total area, all crops	45.4	29.8
Per cent of total value, all crops	42.0	16.9
Crop value per acre	$22.65	$13.90

Alfalfa grown on 45 per cent of the cropped area gives 42 per cent of the total crop value, while grain, occupying 30 per cent of the producing area, yields only 17 per cent of the total value.

Vegetables.—Vegetables were raised on 33,437 acres in 1913, or 5.2 per cent of the total cropped acreage of all projects. In all, vegetables worth $2,161,519 were produced, an average value of $64.60 per acre. Potatoes constituted over two-thirds of this area, and gave an average yield of 161 bushels per acre. Beans, onions, and garden truck of many varieties were extensively grown, with excellent results.

Fruit.—Because of the time and capital required to bring orchards into bearing, the average settler is slow to establish a fruit farm. His finances usually require that his farm be made producing as soon as possible and he may select grain as his principal crop at first for this purpose. As rapidly as possible he should substitute alfalfa for the grain, and where conditions are favorable another step toward better farming may be made by the development of orcharding or other specialized industry, requiring more time and greater care, but yielding correspondingly larger returns.

A number of the projects are well adapted in soil and climate to fruit raising, and considerable areas are now producing. In the 1913 season 16,211 acres, or 2.5 per cent of the total cropped area, yielded over 64,000,000 pounds of fruits, worth nearly a million and a half dollars, or $91.90 per acre. These figures include many trees young in bearing, which accounts for an apparent great drop in the average yield per acre for fruits from the preceding year.

Apples are the principal fruit in area and distribution. In 1913 they were raised in quantity on 7 of the 24 projects operated, occupying 8,666 acres, or half the fruit-producing area, and giving an average value of $91.40 per acre, or a total of nearly $800,000. Peaches were successful on nearly as many projects.

Oranges, lemons, and other citrus fruits were grown on several projects with excellent results. On the Orland project, California, the yield from 71 acres was worth nearly $250 per acre.

Small fruits were produced commercially on 10 projects and over 1,000 acres, embracing in this term berries, grapes, olives, figs, and the like.

Seed.—Alfalfa and clover are grown on considerable areas for seed production. This is an additional phase in which alfalfa shows its merit, in that a seed crop worth $20 or much more per acre may be obtained, with little reduction in the amount realized from hay. The usual practice is to cut the alfalfa once or twice for hay before allowing it to go to seed, and even after threshing the straw has feeding value.

In 1913 alfalfa seed was harvested from 11,467 acres of the project lands, yielding an average value of $17.77 per acre. Clover seed was produced on 3,361 acres, returning a crop worth on the average $34.50 per acre.

Other crops.—Under this title all crops not classed as hay, grain, vegetables, fruit, or seed have been brought together in the statistics given in the appendix. This includes sugar beets, cane, corn fodder, cotton, and other miscellaneous crops of relatively small extent or of local importance on individual projects. The areas devoted to pas-

ture have been included and a value placed on these based on the best obtainable information, such as the farmer's estimate and the current rental value for feeding.

Sugar beets were grown on 14 projects and 14,859 acres in 1913, producing a crop worth on the average $52 per acre. This is an intensive form of agriculture, yielding good returns and benefiting the soil in rotation with other crops. Factories have located on several of the projects to utilize the beets produced under the Government irrigation systems and on adjacent areas.

The United States Department of Agriculture has demonstrated the suitability of the southern projects for cotton production and has pointed out certain varieties of so-called Egyptian cotton desirable for planting in that section. The growing importance of this crop is shown by the increase in the producing area from 1,275 acres in 1912 to 6,117 acres in 1913. From this larger acreage the average yield was about two-thirds of a bale per acre, or about double the average yield for the United States. This favorable result was accompanied by a material increase in price over 1912, so that the product was worth from $25 to $75 per acre, averaging $62 for the three cotton-growing projects.

TWENTY-YEAR EXTENSION.

The better knowledge of the opportunities and limitations of irrigation development, especially as brought out by a thorough study of actual crop production, has led to an appreciation of the fact that the average man on new land and under new conditions can not develop the land, support his family, and at the same time return the cost of the water in as short a period as that previously estimated. Many of the settlers are attempting what is for them practically an impossibility; they are trying to start a farm—a business which requires when fully developed as a "going concern" a capital or investment frequently of from $8,000 to $10,000 or more. They are attempting to do this usually with a capital of perhaps only a fourth as much. A 40-acre irrigated farm in best condition represents practically the investment in time and labor, as above stated, of from $100 to $200 per acre or more in improvements, in subduing the soil, and in stocking the farm.

As a result of a better appreciation of these difficulties in the reclamation of arid lands, and of the great need of money for farm improvements, there has come about an effective agitation for extension of the time of payment from 10 years to 20 years. A series of conferences on this matter was held during the winter of 1913–14, these culminating in the introduction of bills in both Houses of Congress in February, 1914, one of which passed the Senate on March 19 and became a law on August 13, 1914.

It is confidently expected that through the provisions of this act extending and making easier the terms of payment, most of the difficult questions connected with the return of the reclamation fund will be solved and that it will be possible to bring about a still more rapid use and development of the reclaimed lands.

The principal object of this act is to give to those homestead entrymen and water users who are resident upon their farms and who are

cultivating a portion of them easy terms during the first few years, and then later, when better prepared, the somewhat heavier burdens, these coming when the lands are presumably brought to a higher degree of productivity. The new entryman, for example, may pay at the time of making water-right application 5 per cent of the construction charge; if this is $50 per acre he pays down $2.50 per acre, or for 40 irrigable acres $100.

The next four years he has nothing to pay on account of the building charge, but must keep up the operation and maintenance cost. At the end of the fifth year he resumes the 5 per cent payment on the principal (no interest being charged) and later 7 per cent, until the entire amount of the principal has been paid.

In the case of lands for which application has already been made for water rights and which are obligated under the former law to make payment in 10 years, the terms are modified so that only 2 per cent is required during the first four years, then 4 per cent, and next 6 per cent, on the portion of the construction charge unpaid at the time the new agreement went into effect.

In all cases the landowner must pay the cost of the operation and maintenance. These terms also are conditional upon the reclamation for agricultural purposes of one-half of the irrigable area within three years and three-fourths within five years.

PROJECTS BEGUN.

The reclamation act required originally that an irrigation project be built in each of the States named in the law, but in putting this requirement into effect two or more large works have been initiated in some of the States. In Arizona, for example, not only has the Salt River Valley project been provided with a storage reservoir and later a distributing system, but a large project has been begun and water supplied to lands near Yuma. In Colorado also the Uncompahgre project has been supplied with water by means of the Gunnison Tunnel, and before all of the lands were irrigated work was initiated on the high-line canal in Grand Valley. In Idaho the diversion dam for gravity supply for the Minidoka project has been built, electric power developed and a pumping system installed, and in addition the great storage reservoir for the Boise project has been begun, even before the distribution system has been fully utilized. And so on through different States. In each case it is apparent that the available funds would better have been expended to fully complete one of the projects in the State, not entering upon the other until the first had been declared to be finished.

The general plan pursued in initiating this work has been to lay out each project in a broad, comprehensive manner, so as ultimately to utilize the available water and land to its full capabilities. This is in contrast with the usual efforts made by investors seeking large and early profits, who have been forced to select such portions of an irrigable area as would yield the largest and quickest returns. Such have built their works with reference to immediate profit rather than to the ultimate full development of land and water. The Government's policy is to look to the future prosperity rather than to immediate gain. It has entered upon a more comprehensive scheme, which,

though less immediately attractive, in the long run is of much greater value to the country. In pursuing such a course there are evident drawbacks and opportunity for differences of opinion, but nothing could be more in harmony with the letter or the spirit of the law than the planning for later and more extensive projects as funds become available for that purpose.

To fully appreciate the wisdom of taking up a number of these large projects we must have thoroughly in mind the fact that an irrigation project is a living, growing organism. It can not be put to full use and started out at full speed in a few months, like a manufacturing plant. Few settlers have adequate capital at the outset to develop a farm with 40 acres irrigable. During the first year an average of from 10 to 15 acres may be well tilled and profitably productive; during the second year 20 to 25 acres, and so on. It is not until several years have elapsed that an irrigation system is utilized to its full capacity. Thus it may be unwise or impracticable to build and complete an irrigation system with hundreds of miles of laterals and attempt to operate and maintain it at full size during the earlier years, when farmers are slowly getting their lands into productive capacity, establishing markets, and, in short, taking root.

It is largely for this reason that the policy has been adopted of starting more than one project in States where favorable opportunities exist; of laying the foundations, developing the plans, and then permitting the project to grow with the growth of the farming community, one keeping pace with the other. In addition to this there are also cogent reasons, based upon legal conditions, of water rights or claims to the use of water. Several of the large projects have been initiated perhaps earlier than would otherwise have been desirable because of the fact that it was necessary to protect the water rights and secure the largest ultimate prosperity by taking decisive steps and beginning work which if neglected would have resulted in the impossibility of securing future economical use of the water, although the law provides for withdrawal of reservoir sites and irrigable lands which may thus be held in reserve against the future need and more urgent demand for development.

SPEEDY COMPLETION ESSENTIAL TO SUCCESS.

But while this policy of carrying on simultaneously the construction of a large number of irrigation works and of inaugurating new ones without awaiting the completion of the old may thus be defended, there comes a point where such policy must of necessity cease. The resources of the reclamation fund are now overburdened, and the projects under way can not be completed within a reasonable length of time unless there shall be large accessions to the fund. The date of completion must be further delayed by the reduction of annual collections of construction charges by reason of the 20-year extension act, unless there shall be found some other means for the replenishment of the reclamation fund. The initiation of new projects can now only be undertaken at the cost of certain delays in the completion of those under way. Such delays will not only prevent the largest and most beneficial utilization of the works planned and in process of construction, but inevitably must increase their cost

and cause them to suffer the depreciation that comes with disuse. Lands will be withheld from cultivation, canals and structures will deteriorate, and the repayment to the reclamation fund of the cost of such works will be put off. While interest is not chargeable to the users of Government irrigation works, nevertheless account should be taken of the loss of interest on this investment in determining the future construction policy. Every year of delay in completing and opening these works to the use they are intended for causes a heavy loss, not only of interest on the sum invested, but in the annual depreciation of such portions as have been completed or partially completed. The annual maintenance of partially completed works is a heavy charge. A net investment of $84,000,000, with interest computed at only 2 per cent, involves an annual charge of $1,680,000. The total accruals of construction charges for the fiscal year 1914 amounted to only $1,340,435.66. The amount collected was only $251,679.64. Every consideration urges the wisdom of early completion of works now under way and the most speedy possible realization of that moment when all the reclaimable land under such works shall be made productive and contributory to the reclamation fund. Lands withheld from occupation and cultivation awaiting completion of irrigation works are lands wasted. If in private ownership such lands increase rapidly in price. When sold to the cultivator such lands impose upon him so heavy a burden that he finds difficulty in meeting the Government's charges. If public lands entered as homesteads the settlers impoverish themselves, while waiting for the water to come, in vain and useless efforts to wrest an income from the sterile and inhospitable soil. Every consideration of humanity and of business sagacity argues for early completion.

STAGES OF COMPLETION.

While some of the projects are practically completed, others are in various stages of construction; extensions or additional works are being built from time to time as necessity demands or as funds are available. On all of the projects, however, some land is under irrigation, and experience is being gained by the farmers in subduing the soil, in finding the crops best suited to the conditions, and in developing the markets. The increase of farm area is going on coordinately with the extension of the canal system, although at many points, as previously noted, the works are completed to a degree where they can deliver water to twice the area that is being actually utilized.

By thus building up the works hand in hand with the agricultural development of the country it is possible to utilize the experience which is being obtained in the operation and management of the works in perfecting the details of construction of the additional canals or distributing systems. Many improvements are thus being made from time to time, for the reason that it has been impossible to anticipate in all regards the peculiarities of climatic or other conditions which govern the best type of structure for the particular irrigation system.

GENERAL CONDITION OF IRRIGATION.

Throughout the arid West as a whole irrigation projects have been built with great rapidity during the past 10 years. The passage of the reclamation act of June 17, 1902, produced a stimulating effect; almost innumerable private enterprises were started, encouraged through the wide advertisement given to irrigation by the discussions in Congress and by the fact that the United States Government was building large works.

Although the so-called Carey Act had become a law in 1894, eight years previous to the passage of the reclamation act, comparatively little had been done under the terms of this act. It was not until the reclamation act was passed in 1902 that popular attention was drawn to the opportunities for irrigation development. In the same way, although irrigation districts organized under State laws had been considered and tried in some of the States, yet there was no widespread interest in them. Beginning, therefore, at about 1902 or 1903, great interest was taken in the whole subject of irrigation development.

At the present time with hardly an exception no new irrigation systems of any considerable importance are being planned and built. There are a large number of schemes more or less practical, but which are halted for lack of funds.

FACTORS FOR SUCCESS.

It is now well recognized that for the success of all industrial enterprises there are needed three classes of favorable conditions: First, material; second, machine; third, man.

In the case of irrigation the materials to be considered are the soil, climate, crops, markets, etc. Much attention has been given to these in the past, but we are still in the early stages of adequate knowledge of them.

The second element is the machine or, in the present discussion, the irrigation system which provides and distributes water. Much attention has been devoted to this, and the engineers are now fairly well experienced in planning and constructing such systems. The results of the past 10 years are facilitating closer prediction as to cost.

The third element, the man, has been given least consideration in past operations. The underlying cause of failure of many large systems has been the neglect of the irrigator, upon whom more than upon any other one factor depends the successful outcome. There has been too little appreciation of the fact that the greatest possible care and judgment must be exercised in assisting the inexperienced irrigator with counsel and advice. Too often the advisor has had as little experience and knowledge as the one advised. Engineering skill and constructive ability of the highest order need to be supplemented by the knowledge and experience of trained agriculturists and irrigationists in order to develop the best type of irrigation farmer. While the good irrigator can produce twice as much as the ordinary farmer, yet this success can not be attained by a new man without experience or capital unless his efforts are directed into the right channels with wisdom and discretion. Irrigators are made,

not born. There are few of them in the United States. Irrigators seldom emigrate. The dry farmer has to be made over to succeed with irrigation. Only experience or demonstration can enable him to succeed.

PRESENT PROBLEMS.

REVOLVING FUND.

The revolving feature of the reclamation act is one of its most important and valued provisions and has been carefully preserved and followed in all of the operations. As fast as money has become available from repayments of the cost of construction or of operation and maintenance or other sources these funds have been deposited in the Treasury, and thus made available for immediate use in extending or perfecting the work. On practically all of the projects some payments have been made, even those which have not yet been formally declared open. The water has been made available on an annual or carrying charge and the amount thus received has been utilized. Up to June 30, 1914, the amount of $3,500,000 has been thus repaid into the reclamation fund by water users on account of these various charges. While the collection of some of these has been deferred from time to time to meet existing or temporary conditions, yet there has been no suggestion of indefinite suspension of payments or modification of the revolving feature of the act. The settlers are making progress and the lands on the projects are coming steadily under cultivation. There are, of course, difficulties to be met and overcome by the individuals and by the new communities. These arise out of the great expense to the settler of making improvements and of getting his land into condition to grow crops. There has thus arisen from time to time, as above noted, the need of an extension of the period of payment such as has been covered in the bill enacted on August 13, 1914. The legislation extending the period of repayment has given the settler needed time in which to meet his obligations.

SUBDIVISION OF LARGE HOLDINGS.

One of the strongest arguments presented at the time of the passage of the reclamation act was that, by the provision limiting the area for which water might be supplied, it would be possible to bring about subdivision of large areas, which even at that time were in the hands of various individuals or corporations. The results have been as anticipated. The limitations set have resulted in the subdivision of these holdings and the putting of the land into the hands of actual residents. In doing so, however, the owners of these lands have endeavored to secure the largest possible profit while disposing of the land. In consequence there has been prevalent an idea that the reclamation act favored speculators, this even going to the extreme that it has been claimed that the greater percentage of the lands under the reclamation projects is in the hands of speculators, the smaller portion being in the possession of actual settlers.

A brief consideration of the facts, however, will show that this latter assumption is not altogether correct. While there has been much withholding of large areas from cultivation in anticipation of

a rise in values, there is no question but that the greater part of the reclaimed land is in the hands of small owners, men who are actually trying to cultivate the land and who are complying with the requirements of residence on the land or in the vicinity, though many of these have acquired their holdings from speculators at excessive prices, and are bearing consequent heavy burdens of indebtedness.

INCREASE OF SOIL FERTILITY.

One of the most important matters which lies on the border of the engineering or physical considerations under reclamation projects is that of maintaining and increasing the productivity of the soil and not permitting it to deteriorate, and thus decrease the value of the investment. The soils of the arid region are naturally deficient in humus, but in their original state contain a considerable amount of earthy salts which are easily soluble and which, valuable in part as plant food, may become a source of injury if the water is not intelligently applied.

The first consideration on any project is the smoothing or leveling of the surface of the soil so that water can be applied easily and economically, and also increasing the fertility by green manures, such as alfalfa or clover, turned into the ground, or by the application of barnyard manure or other fertilizer. It is a well-recognized fact that economy of water is promoted by fertilizing the ground, and the larger the quantity of manure in the soil the less water is required for successful crop production.

DRAINAGE.

In case irrigation water is supplied in a manner so as to moisten the ground only to the depth of plant roots, perfect water economy will be attained. No surplus water will enter the lower ground strata, no rise of water table will occur, and in consequence no drainage will be necessary. Such perfect water economy, however, is not practically attainable, especially during the earlier years of irrigation, when irrigators are inexperienced, when their lands are not skillfully prepared, and when the soil contains but little humus. With a reasonable water economy the underground losses may be disposed of by natural ground drainage. When the losses, however, are greater than can be so disposed of, the water table, either locally or at some distance, will rise, and when reaching close to the surface the land will become water-logged and drainage will become necessary to preserve its agricultural value. Such drainage work was not at first contemplated to be done under the terms of the reclamation act, but, on the contrary, it was assumed that when the reservoirs and main-line canals had been built, then the settlers would unite to build a distributing system and later incorporate under State law to build the necessary drains when the need of these became apparent. It was found, however, that this simple course of procedure could not be followed, because the men most directly affected by seepage conditions were so impoverished or discouraged that they could not form an organization for drainage purposes, and their neighbors, who more or less directly caused this seepage, did

not accept any legal or moral responsibility in the matter. In short, unless the seeped lands were to be abandoned and the money invested in their reclamation lost, it would be incumbent on the Government to build the necessary drains.

Throughout the arid region from 15 to 20 per cent, or even more, of the lands which at first were irrigated by individuals and corporations has been thus abandoned. In one Colorado valley alone it is reported that about 370,000 acres of lands which had been cultivated at one time or another have been rendered unproductive by excessive use of water and lack of proper drains.

One of the great problems now confronting the arid West is that of reducing the wasteful application of water and of providing adequate drainage where needed. The larger knowledge of the necessities of the case, in connection with a number of the reclamation projects, has brought about instructions that main drains should be provided as the need for these becomes demonstrated.

It is not possible in all cases to anticipate how any particular area will behave with reference to need for drainage. The best soil experts have not been able to predict with certainty in these matters, largely because of the fact that underground conditions could not be ascertained with any considerable degree of thoroughness; even when explored by test pits or wells the conclusions can never be certain and complete. Drains built in anticipation of needs which might arise have been sometimes found to be not needed, and on the other extreme the areas which apparently would never need drainage, because of the relatively steep slopes or because of underlying gravel beds, have required the construction of artificial outlets for excess waters.

It is a fortunate fact that machinery has been developed during the last 10 years which permits drains to be built through wet ground in a manner as economical at times as if they had been constructed in advance of actual needs.

In view of these conditions the Reclamation Service has made a special study on each project as far as practicable, and while anticipating, to a certain degree, the obvious needs, it has reached the tentative opinion that the full construction of the drainage system on each project must wait, to a certain extent, upon the actual application of water to the surface, the degree of water economy which it is feasible to obtain, and the close study of the behavior of the water underground after irrigation has been practiced.

In other words, it has been found that under certain conditions the need of drainage must become apparent before the large and expensive works are constructed. As soon as reliable data are obtained the works are laid out and construction of these is being rapidly advanced on many of the projects. Upward of $500,000 per annum are being spent on drainage.

Attention should be called to the fact that several distinct conditions are sometimes confused in popular discussion of drainage. A distinction should be preserved at all times between drains whose primary function is to take away the excess water from beneath the agricultural lands and the wasteways which are used to remove the surplus from the canal system.

There may be distinguished three distinct conditions to be considered, as follows:

1. The wasteway, sometimes automatic in operation, which relieves the main canals and laterals if they are filled to overflowing by sudden storms. These may be termed "the safety valves" of the system.

2. The outlets or "desaguas" at the lower end of the distributing system, provided to discharge any excess of the water which has been turned in at the head of the canal or any portion called for but not used by the farmers on their fields. This waste measures to a certain extent the efficiency of the management. If there is little, and each farmer has received adequate water supply for his crops, it may be assumed that the distribution has been carefully made. The occurrence of the wastewater in the lower outlets should be carefully noted and some one called to account for it. If wasted from the fields, it indicates that the farmer has had too much water or has carelessly applied it. In some foreign localities the farmer is called upon to pay from two to three times the usual charge for the water thus wasted. In other places the supply is rigidly cut down until he permits no water to escape from the surface of his land.

3. The true drains, usually located from 6 to 10 feet beneath the surface, whose function is to keep down the water plane, or water table, so that there will not be an excess of water in the soil above that needed for the best growth of the plants. If the water table rises too high, many of the plants are either drowned out or their roots forced to keep near the surface. While it is impracticable to do away entirely with the need of these deep drains, yet under general conditions the less the amount of water coming from these the greater the water economy obtained and the better the agricultural progress of the locality.

The necessity of drainage works may result not only from imperfection of water economy in irrigation, but also from extensive seepage losses in canals and laterals. Such losses can not be readily estimated in advance, and it has generally been found most economical under normal conditions to construct canals and laterals in the ordinary manner and without lining, and to ascertain subsequently whether any excessive losses occur, locate the stretches of canals and laterals where they do occur, and then reduce these losses by puddling or lining.

The abundant supply provided by the Reclamation Service has made possible the excess use of water, and the large heads of water carried in the canals and laterals have caused, in some cases, excessive losses, thus producing conditions favorable to a rapid rise of the water plane below the irrigable areas.

The water-logging and seepage of lands on the various projects has continued thus during the past year, in some cases sufficient to render considerable areas unfit for cultivation or to greatly reduce their crop yield. In general, the rise in the water plane is caused, as above noted, (a) by applying to the lands more water than is necessary or can be used by growing crops, and (b) by losses from canals and laterals.

Studies and investigations which have been made show that the character of works necessary for the relief of the water-logged and seepage conditions must be such as to effect a general lowering of the ground-water plane over the greater portion of the irrigable areas. It has not been possible to control the water plane and pre-

vent water-logging of lands by the construction of shallow drains for taking care of the surface water incident to irrigation. In other words, the drainage of the irrigated lands, especially where large areas are concerned, is a problem of deep drainage, in which underground conditions must be given careful consideration.

Investigations frequently show that the owners of lands which have been seeped and water-logged are in no way responsible for this condition, and that the prime cause is either the carelessness of one or a number of irrigators located on higher lands in using excess waters or to the unavoidable losses from canals and laterals.

It has been found, also, that in order to construct efficient drainage works it is necessary to make not only a careful study of large areas to determine the origin and direction of flow of the underground waters, but also to find where the source can be best tapped to carry out the excess supply and protect the adjacent lands. On many of the projects it has been learned that excess waters which have found their way into the subsoils, either from overirrigation or from canal losses, have traveled for long distances underground before coming sufficiently near the surface to threaten the irrigability of the land.

During the year 1913–14 construction of drainage works has been under way on 10 of the projects, viz, Yuma, Minidoka, North Platte, Carlsbad, Shoshone, Boise, Huntley, Lower Yellowstone, Klamath, and Truckee-Carson. On others studies and investigations have been continued. It is estimated that during the year nearly 100 miles of drains were constructed, about one-half of which have been open and the remainder of the closed type.

The results which have been obtained have been a general lowering of the water plane and the protection of the irrigable areas tributary to the drains. The areas which have been reclaimed or protected by means of the works constructed can not be estimated with any degree of certainty, as it is impossible to state to what extent seepage would have spread had drainage works not been built. The area which has been water-logged and injured by seepage amounts to about 39,000 acres, distributed over 15 projects. The area protected by constructed drains on these projects is estimated at about 144,000 acres, while the area to be protected by means of all drains constructed or whose construction has been authorized is estimated at about 188,000 acres. The estimated cost of drains already constructed, per acre of land protected, is over $10, while the estimated cost of all drains contemplated, per acre of all land protected or whose protection is contemplated, is somewhat larger. In some cases it has been found, where drainage works have been effective in lowering the ground water so as to permit lands being brought under cultivation, that the excess of waters applied to the soil through irrigation has been sufficient to again raise the water table too near the surface during the peak of the irrigation season and to produce temporarily a condition injurious to crops.

In general it may be said that, except where protected by drainage works, there is a gradual rise of the water table over most of the projects. This indicates that additional protective works will be required over large areas, in order to prevent the water table rising near enough to the surface to interfere with the irrigability of the

land, either through water-logging or the deposit of alkali on the surface as the result of a capillary action and evaporation.

In order to fully protect the lands it is necessary, first, to reduce the amount of water applied to the soils for irrigation as nearly as possible to the actual amount required for plant growth; second, to reduce the losses from canals, where excessive, by means of water-proof linings; and, third, to construct the necessary drainage works for lowering and controlling the water table.

One of the most important factors, which contributes to the seepage and water-logging of the land, is underground waste. This is due in great part to an apparent indifference on the part of many irrigators in preventing water not needed for the growing of crops from reaching the soils. It is frequently the case, even where care is exercised in preventing surface waste, that neglect is shown to water being wasted underground.

Careful investigations are being conducted to determine the duty of water on the several projects. Under the law charges for operation and maintenance will be assessed in proportion to the amount of water used, taking into consideration the duty of water on the varying soils. This plan will do much to effect economical use of water and promote careful irrigation practice.

The above discussion of the drainage problem is presented at this time, because of the fact that the experience of the last year has shown that far more consideration must be given to this than in the past, and that in making plans for the future it is necessary not only to make allowance in construction of the works, but, more than this, to so operate them as to enforce, both directly and indirectly, the most economical use of the water. This may be accomplished by the most effective of all means, namely, by touching the "pocket nerve" of the man who uses and wastes the water to the injury not only to himself, but even more to his neighbors.

INCREASE IN COST.

The increase in cost of the irrigation projects over the amounts originally assumed is a matter which has given considerable concern to various public men. It is true, and has been brought out in the annual reports of the Reclamation Service, that there has been in many instances a notable increase in the actual cost per acre of reclaiming lands over that which was assumed a dozen years ago. It has been explained frequently that this increase in cost is due in part to the general increase in cost of labor and material such as has taken place throughout the country.

The principal increase above the original assumption is due to a still more obvious fact, namely, that the projects as built have been quite different in conception from those at first considered. To put the matter in the briefest possible terms, the Government has provided for the water user, generally upon his petition, many facilities which he would otherwise have been compelled to secure for himself at large outlay and personal sacrifice. These have consisted in distributing systems and in numerous structures which were not believed to be within the necessary province of the Government to build when the works were first discussed. The difference is comparable to that

which every farmer encounters when he starts out with plans or estimates for a well-built, permanent barn for his cattle and ultimately, after several years of consideration and in accordance with the development of a successful farm, has equipped it with sanitary appliances and up-to-date machinery; the original cost of the barn can hardly be compared with the complete dairy equipment as ultimately reached. This is the condition on most of the reclamation projects. The original cost per acre was for storage up in the mountains many miles away, and in most cases for main canal in addition thereto; the final cost was for a complete system equipped with controlling works and measuring devices and delivering the water to each farm unit.

The original authorized expenditures for various projects were in many cases the amount set aside for much smaller and less extensive works than those subsequently authorized by the Secretary of the Interior, after full consideration had been given by him to the reports of his engineers and to requests from citizens and entrymen for additional facilities.

Taking the Salt River (Ariz.) project, for example, the preliminary estimate was for a reservoir of a certain size. Later estimates were made in succession for greater and greater storage capacity, and more complete works, including electric-power development, pumping, and complete system of distribution, all of which items seemed wise and no one of which has been found unnecessary. In fact, it is the opinion of well-informed water users that these works should still be supplemented or extended rather than curtailed, and surveys are being made for more works.

There has been considerable exaggeration in the statements which have been made concerning the increase in cost above the original or first assumptions of the engineers. Many of the popularly stated "original estimates" are not based upon definite information, but have gradually grown up in the minds of the persons quoting them and are without supporting facts. In some instances they are said to be semiconfidential assertions made by engineers; in others the figures appear to be wrongfully applied, so that while there is no doubt that there has been an increase over the original conceptions as to what the works would cost, yet much of the increase popularly claimed is found not to be based upon correct information. As a matter of fact, the engineers and all connected with the works at the outset were instructed to be extremely careful not to attempt to announce any estimate of cost until the Secretary had taken action and had given the formal public notice as required by the reclamation act.

ECONOMIES OF GOVERNMENT CONSTRUCTION.

The following table has been prepared to show in a general way some of the savings which have resulted from the construction of certain classes of work by the Government force direct, as against the lowest bid received, and illustrates, if the assumptions are correct, that there has been a saving of nearly $1,400,000 in the cases mentioned over expenditures which would have been made had the contract been awarded and the work carried out in accordance with the specifications.

Estimated saving, construction by Government forces.

Project.	Feature.	Government force.	Estimate if by contract.	Estimated savings.
Arizona, Salt River	Cement, 338,452 barrels, at $3.14.	$1,063,542	[1] $1,655,030	$591,488
	Lumber, 2,964,000 b. m., at $44.30.	131,100	185,250	54,150
Colorado, Uncompahgre Valley	South Canal, division 18	7,322	11,851	4,529
Idaho, Boise	Upper Deer Flat embankment.	279,821	396,522	116,701
Nebraska-Wyoming, North Platte	Pathfinder Dike	221,800	255,881	34,081
Nevada, Truckee-Carson	Distribution system, district 5.	32,132	35,925	3,793
Do	Drop, district 4	8,359	13,811	5,452
New Mexico, Carlsbad	McMillan, east embankment.	8,058	10,520	2,462
Oregon, Umatilla	Cold Springs Dam	305,228	340,824	35,596
Oregon-California, Klamath	Keno Canal excavation	58,355	74,610	16,255
	Clear Lake Dam	88,524	97,248	8,724
	Clear Lake Dike	10,882	23,845	12,963
South Dakota, Belle Fourche	Belle Fourche tunnel	33,230	92,592	59,362
	Belle Fourche siphon	59,310	100,022	40,712
	South Canal, scheme 1	86,960	103,318	16,358
	Anderson siphon	13,096	18,427	5,331
	Whitewood siphon	16,347	24,410	8,063
	South Canal, scheme 2	39,753	67,402	27,649
Washington, Okanogan	Main Canal [2]	89,180	107,064	17,884
Washington, Yakima storage	Kachess Dam	324,650	418,100	93,450
Washington, Yakima, Tieton	Main Canal, excavation	100,000	435,000	235,000
Total		3,077,649	4,467,652	1,390,003

[1] At $4.89.
[2] Part of this work was done by small informal contracts after bid for entire work had been rejected.

LAND PRICES.

The prices of irrigable land reclaimed by works built by the Government, as well as those by private parties, have, as a whole, declined during 1913, and approach more nearly what may be considered a normal or fair value. In other words, the inflation of prices which has prevailed for several years has run its natural course, and there is a better appreciation of the true value of irrigable land, although the prices asked are still such as impose a heavy burden upon the man who seeks to obtain a home.

Irrigable land in itself has little value; its true worth lies in the amount of effective work which has been undertaken to render it productive. This includes, first, the construction of the irrigation system which brings water to the lands, and by which the land can be made of value; second, the amount of cultivation or improvements put upon the land; third, its relative position with regard to markets, or accessibility; and, fourth, soil, climate, and other physical conditions. These are put last, because throughout the arid region, as a rule, the climate is such and the soils are of such a character that with the other three supplied the lands can usually be made productive.

The great obstacle to the development of the arid West has been that on top of these, which may be called legitimate costs, namely, of procuring water, of cultivation, and of providing means of access to the land, there has been added a large unearned increment of value, due simply to the fact that irrigable land is a natural monopoly. If the Government could have received this increase in price of the raw or uncultivated land, due to the fact that it had planned and con-

structed the works, it would have ample funds for building all of the proposed practicable projects. Unfortunately, however, this increase goes, not to the agencies which build the work, but is diffused among the owners or claimants of the land and is utilized, not in the actual building up of the land, but results in developing a desire to profit rather by the sale of the lands than by the production of crops.

The history of many of the projects shows that as soon as surveys are undertaken the land prices immediately rise; homestead relinquishments or lands are offered at from $5 to $10 per acre. As the work progresses these prices gradually increase. The expenditure of several hundred thousand dollars in the vicinity largely in paying the laborers on the works makes money plentiful for the time being; new towns spring up, and there is a rapid increase in all prices. Few people appreciate where the money is coming from, that the supply is temporary, and that as soon as the works are finished then there must necessarily be a reaction. Trading in tracts of land and sales of relinquishments continue quite active during the construction period, and the prices steadily increase until the works are completed; then there is a gradual tightening. Money is less plentiful, and the owners of the land begin to appreciate that they must get them into cultivation. They also awake to the fact that markets have not yet been supplied; that the best crops are unknown; that much time and money must be spent in experimentation. As one man after another becomes discouraged, the prices asked for the lands gradually diminish.

This has been the experience throughout all new countries, and the arid West has been no exception. During the years 1910 to 1912 the land prices probably reached their high-water mark. Prices were asked for uncultivated land as high as $30 to $50, or even up to $75 or $100 per acre. That is to say, these were the prices demanded by the homestead entryman, or others who had acquired title for their equity, and with the full knowledge that ultimately there must be paid to the Government the cost of bringing the water to the land, which might be $50 or more per acre, payable in 10 annual installments. More than this, the purchasers rarely had enough money to make any considerable payment on the purchase price—usually one-fourth or one-fifth of the amount laid down, the remainder to be paid in installments, with interest on deferred payments at from 8 to 12 per cent. It is this fact that has caused the greater part of the distress of the new settlers, viz, the fact that they had assumed a burden of interest charges, and in some cases of taxes, heavier than they can bear, without reference to the fact that payments must be made to the Government. During 1913 there was a better understanding of these conditions, and in some instances the prices which had been agreed upon, or which are being asked for the raw lands, were cut in half or greatly reduced, with corresponding relief to the men who had attempted to make the purchases. Some of these had paid down their last dollar in making a first payment, and were unable to keep up the subsequent payments.

Many of these settlers are land-poor, in that they have attempted to pay for more land than they can possibly cultivate. Many instances might be cited where a man with adequate funds to cultivate 20 or even 40 acres and to support his family in comfort had spread

out his capital over 160 acres and then found, after he had tied himself up, that he could not sell any portion of this 160 acres at the rate per acre which he had agreed to pay. There have been many pitiable instances of this kind and of appeals made to the Government for relief because of the fact that the payments to the original entrymen or owners of the ground were far beyond the means of the men who were now living upon the irrigable lands. It was such instances of the evil done by speculators in private lands under Government works that caused the insertion in the Reclamation Extension Act of a provision empowering the Secretary of the Interior to fix the price at which such lands may be sold before entering upon the construction of irrigation works for private lands.

By the spring of 1914, however, these conditions were better appreciated, and, as before stated, the prices asked for the irrigable lands developed by the Government are lower than in previous years and more in accord with the ability of the newcomers to make payment.

PERMISSIBLE COST OF IRRIGATION.

How much can a man afford to pay for irrigated land? This is the most important question of development of the arid West; or, to put it in another way, What is the permissible cost of land with water rights? The land itself, without water and without cultivation, has little or no value. The supply of land is greater than the supply of water—that is, there is not water enough for all of the land—and hence water is a natural monopoly, thus complicating any estimate of value.

There is a limit beyond which the purchaser of irrigable land should not go. This limit is set by the probability of his making not only a living for himself and his family, but a fair profit on the investment. If he pays too much for the land or agrees to make payment with interest at current western rates of 8, 10, or even 12 per cent on deferred payments, his profits quickly disappear, and his investment may be eaten up. What, then, is the permissible limit?

In arriving at a figure which will fairly indicate the permissible cost of irrigation there must be considered—

(*a*) The amount and value of crops probably obtainable each year.

(*b*) Total farm investment in land and water rights.

(*c*) Cost of clearing and leveling.

(*d*) Cost of buildings, fences, and general farm equipment, including live stock.

(*e*) Length of time required to put the farm on a paying basis, and value of farmer's time during this interval.

Considering all these features in the light of the best data now available, it is apparent that the limit for the moderately high and relatively cool areas of the central arid West is about $50 to $75 per acre for raw land with water. This may be increased in the more southern part of the arid region, at lower altitudes, where irrigation is practiced all the year around and two or three crops a year may be produced. Here the prices for raw land and water right may safely run up to $100 per acre, or even more. Analyzing a little in detail the methods of arriving at these prices, the following statements may be made:

(*a*) The amount and value of crop probably obtainable are best ascertained by study of what has already been accomplished on the various reclamation projects under pioneer conditions. The average crop production for the United States under irrigation ranges from about $20 to $30 per acre. This, it is true, includes all of the cases, both of success and of failure, wherever men have applied water and have cultivated the ground in whole or in part. It may be asserted that in arriving at the averages only the successful cases should be considered. If this is done, the average crop production thus obtained will probably be nearly double the amount above noted; but, on the other hand, the cost must be paid by all of the irrigators, including those who have had very moderate success, if any. If discrimination is attempted in arriving at these crop statistics, then the results simply become of little more value than an individual guess. There seems to be no escape from the conclusion that in arriving at the amount the average man can pay for land and water, we must take the average production which has been attained in the past.

(*b*) The total farm investment in land and water may be considered as an outlay upon which the farmer should earn at least 6 per cent interest. If, therefore, his farm investment for 40 acres is on an average of $50 per acre, or $2,000, he should have a net return of $120 on this investment over and above all other receipts.

(*c*) The cost of clearing and leveling the irrigable lands varies greatly in different parts of the arid West, and ranges from about $5 minimum, up to as high as $50 per acre in the case of the lands such as those in the vicinity of Yuma, Ariz., which require clearing, grubbing, and leveling of the surface. If we assume that $25 an acre is a fair average for getting the ground in good condition and the surface leveled, then the total investment on a 40-acre farm would aggregate about $1,000, which at 6 per cent should return $60 per year.

(*d*) The cost of buildings, fences, and general farm equipment, including live stock, is the most variable, as it is dependent upon the character of farming and the needs of the individual family. For a 40-acre farm, however, in good condition, it is safe to assume that the house, fences, buildings, and live stock will cost upward of $2,000, and this, although largely an unproductive investment, should also be charged at the rate of 6 per cent, or $120 per year.

(*e*) The length of time required to put the farm on a paying basis and the value of the farmer's time during this interval is an item which is seldom considered, and is really one of the largest investments which is made. In the case of 40-acre farms it is assumed that the first year the farmer may break up the entire surface and get in a grain crop, possibly carefully leveling about 10 acres. The next year he will add to this and have leveled up 15 or 20 acres, and so on, in the course of five years getting the entire 40 acres into excellent shape. Meantime he must keep up the operation and maintenance charges on the entire area and possibly pay a considerable part of the water-right costs, but receiving the full productive capacity from only a portion of the land on which he is making these payments. It may be considered, therefore, that during these three to five years the time may be largely spent in development, and the returns are small. Thus we have the condition of a considerable investment in time and

money, but without the farm being on a full producing basis, the outlay for equipment and development work, leveling the ground, etc., being at the maximum and the income at the minimum.

IRRIGATION AS A BUSINESS.

In summing up what has been stated in the preceding pages regarding the success of the individual farmer and the vital importance of this success to the work now being performed under the terms of the reclamation act, the lesson is taught that irrigation farming is a producing and manufacturing business—one in which success, either in building the irrigation works or in operating them, ultimately rests in the business ability of the individual farmer to properly utilize the facilities which have been provided by the liberality of Congress.

Farm management sums up the whole story: A good farmer and a good manager on a poor piece of land may succeed, while a poor manager on a good piece of land fails. The best of engineering skill, the largest of economic expenditure, the creation of the finest and most complete irrigation system are of little avail unless well administered and accompanied by good management on the part of the majority of the farmers to whom water is served.

Analyzing the situation along this line, it appears that what the Government is endeavoring to do is to provide opportunities for thousands of families each to become established in a semi-independent producing and manufacturing business, getting the raw products out of the soil, and manufacturing these, through the use of domestic animals, into milk, butter, eggs, pork, mutton, beef, etc., returning the fertility as completely as possible to the soil, and selling from the farm only such raw products as can not be economically worked up into the more condensed and valuable form. The continued production and sale off of the farm of raw or unmanufactured products, such as hay and grain, invariably become unprofitable in the end, both because of the deterioration of the soil from failure to return fertility to it, but more than this from economic reasons based on the fact that the farmer's time and investment are not put to the highest use.

Viewing, therefore, an irrigated farm as a manufacturing institution, it may be said that when the farm is in a highly productive capacity and is what may be called a "going business concern," there is represented an investment of capital or labor equivalent for, say, a 40-acre farm, in land, water, buildings, equipment, etc., of not far from $10,000. This average is derived from consideration of well-developed, productive, irrigated farms throughout the arid West. It is perhaps best illustrated by the figures which have been obtained by the Department of Agriculture for a group of farms in the central part of Utah, where a careful analysis of cost and returns has been made, the only one available at present for the arid region.[1]

These returns relate to 69 farms which are fairly representative of conditions throughout the arid regions where the pioneer stage has been passed. The average size of these 69 farms was under 50

[1] U. S. Dept. of Agriculture, Bulletin No. 117, Profits in Farming on Irrigated Areas in Utah Lake Valley.

acres and the crop area about 30 acres. The average capital invested was $9,000, or, in round numbers, $175 per acre, including all improvements. The receipts were slightly under $1,500, and out of these were paid a little over $600 for expenses, leaving a net farm income of nearly $900, of which the labor income was figured at a little over $400, leaving, in round numbers, $500 for the earning of the investment and of the farm itself.

Taking out of the 69 farms a group of 30, which are devoted mainly to fruit and the raising of sugar beets, we have an average size of 60 acres, of which a little over 40 acres are cropped. The capital invested is a little under $12,000 and the receipts approximately $2,000, with an expense of $950, leaving a farm income of about $1,000, of which the labor income is something over $600.

The figures above quoted, in round numbers, indicate the fact that in any well-established irrigated community, such as may result from the investment of the Government, there must be, in addition to this investment, a large amount of labor and capital applied by the settlers in developing the farm, in providing implements, and in many related efforts. The needed capital, if not available at the outset, must be made up by extra exertion on the part of the newcomer, who must create in due time, by his labor and thrift, what is equivalent ultimately to an investment of, say, $10,000.

It is not to be inferred from this that there are not large numbers, possibly a quarter or even a third of the settlers, who are attaining far larger returns from a much smaller investment, but in all these matters we must consider as nearly as possible the average, as it is the average man whose success is vital to the working out of the enterprise as a whole. It is not sufficient that a quarter or a third of the people should be successful, or even a half; all must be successful, else the Government's investment is profitless.

Most of the newcomers attracted to an irrigation project are men with relatively small capital. The amount which they bring is not always wisely invested, but may be lost in paying excessive prices for the raw land. The problem is to take these men, coming with small capital and less experience, and get them started in a business which, when fully developed, will represent a considerable investment, as above stated.

It is the failure to recognize the difficulty of building up an irrigated farm as a business enterprise that has been at the foundation of most failures in irrigation projects. While it is popularly stated that inadequate engineering, reckless financiering, and lack of settlers are the immediate causes of failure, yet the ultimate and final reason comes back to the inability of the average homeseeker to take up immediately and carry forward successfully this new and intricate business of irrigation farming. The time consumed in getting on the solid foundation of a "going business concern" means loss of interest to the investor, depreciation of the investment, and general discouragement.

Inflation of prices of raw land has crippled the development of the West by imposing a back-breaking burden upon the men who have bought irrigable lands, for which they have obligated themselves to pay in installments, with interest on deferred payments at from 6 to 12 per cent. The average irrigator can not afford to pay any considerable amount for raw land, which he must clear, level,

subdue, and bring to productive capacity, support his family, pay heavy taxes, and make payments for water charges. If, on top of these expenditures, which cut heavily into his income, he must make payment of 10 per cent on deferred payments of, say, $50 an acre, or $5 interest on each acre, he is consuming the greater part, if not all, of his earnings and is not able to properly build up his farm. The greatest step forward in bringing about the rapid development of the West would be to obtain and diffuse correct information regarding irrigation farming as a business, including in this a careful analysis of the expenditures and receipts of the irrigation farming.

The success or failure of the pioneer under irrigation depends upon his ability to tide over the interval between the date at which he arrives, with say $2,000 in capital, until by his energy, skill, and self-denial he has developed his farm to a point where it is equivalent in earning power to the average of the older farms which represent an investment in time and labor of say $10,000.

The Government or the corporation which is financing the enterprise may be assumed to give or make available for the newcomer a 40-acre tract of land. It provides water for this land, usually on long-time payments, the cost being perhaps $2,000 for the 40-acre tract. This original investment, together with the newcomer's assumed capital in cash, implements, live stock, etc., of $2,000 provides the initial investment of $4,000 which is to be increased gradually by hard and intelligent labor and frugality until the accumulation represents say $10,000, at which time the farm will have been completely developed and stocked with animals so that it can be said to be on a good basis as a "going business concern."

During the years necessary for this development of the farm and accumulation of live stock and other equipment the farmer receives in return for his investment first a home for his family and one where he is able to produce the greater part of the food needed for the family from his fields or kitchen garden. It is the opinion of some investigators that in considering the irrigator's income above a bare living, there should be taken first the interest on his investment, which at 6 per cent on $2,000 may be figured at $120 per year. This amount under good management should be gained and added to his capital. In addition to this it is assumed that his labor on his farm should net him an average of between $1 and $2 per day. Each year he should show an accumulation of at least $600 to the value of his farm. In the course of 10 years, therefore, the interest on his original investment plus his labor and some profits should have enabled him to bring the total investment up to at least $10,000, the limit above set, assuming that he has no particular misfortune.

The above general assumptions are given simply to indicate the importance of time in the building up of an agricultural community from small beginnings, and are based upon premises which may not be altogether tenable. Theoretically the irrigation farmer should succeed in 10 years. Actually, however, owing to market conditions, to delay in the development of water service, and to the unexpected and unprovided for water-logging of his land, due to seepage from canals and to overirrigation, his problems are less easy of solution than the above might seem to indicate. Other obstacles to the

growth, as above crudely outlined, are heavy taxes and excessive interest rates on unpaid debts which may prevent accumulation of the necessary capital and thus keep the farmer from getting on a sound business basis. This is notably the case with those irrigators who have unwisely agreed to pay a large amount for undeveloped land, who have tied up all their available money in making the first payment and who are forced to pay high interest charges on deferred payments for lands not fully productive. In these cases the interest charges, together with high taxation and other items eat up the accumulated savings and leave the farmer at the end of the years even less well equipped than he was at the beginning.

WORK OF THE SUPERVISOR OF IRRIGATION.

It seems pertinent in this connection to refer briefly to the work of the Supervisor of Irrigation, Mr. I. D. O'Donnell, of Billings, Mont. The underlying thought which prompted the creation of this office and the appointment of Mr. O'Donnell as the first incumbent was that there should be in the field, connected with the service, a practical business farmer, who could look at questions involved in the operation and management of the projects from the standpoint of the water user as well as from that of the service; who could advise the other officers of the service on all matters having to do with the efficient operation of the projects, and assist the water users on all matters coming under the general head of "better farming" methods.

Excellent results have already been accomplished through this arrangement. Grievances which loomed large in the eyes of water users have in most cases proved insignificant when clearly and painstakingly explained by the Supervisor of Irrigation. The employment of water users and members of their families has been encouraged, and many water users are learning how to care for irrigation systems and deliver water to lands. Numerous meetings have been held with the farmers and the officials of the water users' associations for the purpose of discussing on the ground questions of interest to the water users, stress being laid upon the improvement of farming methods. A number of suggestions have been made in connection with the marketing of farm products, and it is believed that before many years this difficult question will have been solved to the satisfaction of the water users.

Active cooperation has been carried on by the Supervisor of Irrigation with the officials of the Department of Agriculture, with a view to the assignment of farm advisers to the various projects to assist the settlers, with the State agricultural colleges in a general campaign to secure economy in the use of irrigation water and in conducting farmers' meetings, and with the General Land Office in settling disputes regarding homestead matters and in making clear to the settlers the regulations affecting the entryman.

In fact, it may safely be stated that the work of the Supervisor of Irrigation has aided materially in bringing about a feeling of confidence among the water users in the administration of the Reclamation Service and a desire on the part of the water users to cooperate to the fullest extent with the service in the interest of the projects.

PROBLEMS OF MANAGEMENT.

The large problems now confronting the Reclamation Service are not only those of building new works and of overcoming engineering difficulties, but also the successful management of the large systems already built, particularly in (a) the more complete use of the land to which water has been brought; (b) the prevention of waste of water, with its resultant deterioration of soil and creation of swamps and alkali flats on formerly cultivated lands; (c) the handling of water on sandy soils; and (d) meeting exigencies and demand, which must be worked out patiently and systematically in the field.

As yet there is no well-recognized standard of practice in most of these problems of management, and consequently no easy way of demonstrating the relative degrees of success attained on the various projects. It is of great importance that there be established certain good standards of operation and maintenance, not merely for the benefit of the reclamation projects alone but for that of the other large systems built by private capital. The steps toward such systematization of the management have been taken in the preparation of what is known as the Use Book, or Manual of Operation and Maintenance, defining or describing some of those matters which are now generally accepted and outlining in a general way the course of procedure, one from which it will be possible in the future to make comparisons of actual cost and results attained under different types of work and under different managers.

POWER DEVELOPMENT

In connection with the construction of irrigation work, particularly of dams on the larger rivers, it has been found necessary to develop more or less power. Power plants erected under these conditions are operated principally for pumping water for irrigation and incidentally for other purposes, the excess power being sold for domestic or industrial uses, such as lighting, heating, cooking, and operation of small machinery.

The engineering and business details connected with the development and sale of power, particularly by hydroelectric means, has increased steadily during the past year.

The largest operations are those in Arizona, but next to these are those in southern Idaho. A brief review of these illustrates the importance of the electrical development for industrial purposes, which, however, are kept at all times secondary to the necessities of irrigation.

The main purpose in the development of electric energy by the Reclamation Service is the production of cheap power for raising underground water to the surface or surface waters to lands which are too high to be reached economically by the ordinary gravity method throughout. There are other uses, however, to which this energy can be economically applied. Taking these in the sequence of events they may be summed up as follows:

Construction.—This embraces all electrical devices employed in the handling of materials, in lighting the works, and in facilitating other operations.

Transportation.—This includes the building and operation of works for transporting material to be used in construction.

Commercial.—An important outgrowth of the above is the disposal of excess electric energy developed largely in connection with pumping, but sold for lighting or industrial purposes, the proceeds being used to assist in defraying the cost of the pumping of water for agricultural purposes.

The methods of development of electrical energy and the character of machinery employed are largely those of the usual commercial practice, the attempt being made to keep well in the lead. In some cases notable advances have been made over customary methods. As might be inferred, the largest amount of energy is developed by the use of water power. In other words, hydroelectric planning and construction form the principal feature of this class of engineering works. There are, however, a number of relatively small plants in which the energy is derived from the consumption of fuel either utilized in the production of steam or in the more direct use of oil or gas in the ordinary engines.

In all of this development of power undertaken by the Reclamation Service, not only in connection with electrical devices but also in its other operations, records are maintained of the actual cost of the various items. Quite frequently in statements of cost the matter of overhead charges has been neglected, or many items which are properly to be considered in this connection are not entered because they are carried on regular appropriations. These neglected items usually consist of salaries of permanent officials whose time is largely devoted to the particular work in hand, but is not charged to it. Such overhead items are included in all cost statements of the Reclamation Service, which therefore give, perhaps, a more accurate conception of actual and necessary expenditures than those which do not include such items.

Without entering into an elaborate discussion of these costs, it may be said that they range in general from a few mills, or even less, per kilowatt hour for power developed in large quantities by hydroelectric plants up to a few cents per kilowatt hour as developed by steam plants.

The costs for 1913 are shown in the following table:

Power plants operated by reclamation service in calendar year 1913.

Reclamation project.	Power plant.	Location.	Type.	Rated capacity.	Output in kilowatt-hours.	Cost in cents per kilowatt-hour.[1]
				Kilowatts.		
Salt River	3 plants	Arizona	Hyrdo-electric	8,350	9,518,570	0.810
Boise	Boise	Boise River, Idaho	do	1,875	7,082,123	0.268
Minidoka	Minidoka	Snake River, Idaho	do	7,000	28,265,287	0.126
Truckee-Carson	Lahontan	Lahontan, Nev.	do	1,250	930,360	1.118
Rio Grande	Elephant Butte.	Elephant Butte Dam, N. Mex.	Steam turbine electric.	1,875	2,065,840	2.873
North Dakota pumping.	Williston	Near Williston, N. Dak.	do	1,150	1,145,337	2.614
Strawberry Valley	Spanish Fork.	Near Spanish Fork, Utah.	Hydro-electric	1,000	861,705	[2] 2.572

[1] These costs are at power-plant switchboards and include, in addition to all maintenance and operating expenses, general expense and plant depreciation.

[2] Includes heavy canal expense.

For purposes of comparison with the above statements of cost, it may be said that it is a popular belief that the cost of manufacturing electric power at Niagara Falls is about 0.2 cent per kilowatt hour, and that for power development in blocks of say 5,000 kilowatts upward it is more economical to erect a modern steam-power plant at Buffalo than it is to transmit this energy from Niagara Falls at a cost at Buffalo of say 0.25 cent per kilowatt hour. In other words, the modern economy of the steam engine and generator is such that where fuel is cheap current can be manufactured on the ground and utilized without transformation more economically than it can be transformed and transmitted over a considerable distance. The cheapest hydroelectric power reported is in the South, stated at 0.1 cent per kilowatt hour, or about $6 per horsepower per year.

On the Minidoka project of the Reclamation Service the cost of producing power at the plant switchboard is seen from the above table to be about 0.126 cent. The surplus power over that needed for irrigation pumping on this project is sold as a by-product. For this purpose the Reclamation Service contracts with a local company or distributor, protecting the ultimate consumer by provision in the contract limiting the maximum rates chargeable by the distributor. These rates are shown in the following table:

Electric power for commercial use, Minidoka project, Idaho.

[Contracts Nos. 322, 323, and 326 and supplemental contracts.]

MONTHLY RATES.

TO DISTRIBUTOR.		TO CONSUMER.	
Per incandescent light of 15 watts	$0.03	For 20 incandescent, 15 watts (5 cents each additional light)	$1.50
Per incandescent light of 15–60 watts	.10	For 5 incandescent, 15–60 watts (25 cents each additional light)	1.50
Per incandescent light of over 60 watts (for each 60 watts or fraction)	.10	Per light over 60 watts (for each 60 watts or fraction)	.25
Per arc light, 700 watts to 10 p. m.	1.50	Per arc, 700 watts to 10 p. m.	2.50
Per arc light, 700 watts all night	2.50	Per arc, 700 watts all night	4.00

HEATING RATES.

TO DISTRIBUTOR.		TO CONSUMER.	
Per device, Sept. 1–June 1	$0.50	Per device, 1,000 watts Sept. 1–June 1	$1.00
Per device per 1,000 watts, June 1–Sept. 1	1.50	Per device per 1,000 watts, June 1–Sept. 1	2.50

FLATIRON RATES.

TO DISTRIBUTOR.		TO CONSUMER.	
Per flatiron, 700 watts	$0.25	Per flatiron, 700 watts	$0.50

METERED LIGHT AND APPLIANCE RATES PER KILOWATT HOUR.

TO DISTRIBUTOR.		TO CONSUMER.	
First 2,500 kilowatt hours in month	$0.027	First 25 kilowatt hours in month	$0.07
For 2,500–5,000 kilowatt hours in month	.025	For 25–50 kilowatt hours in month	.06½
For 5,000–10,000 kilowatt hours in month	.023	For 50–100 kilowatt hours in month	.06
In excess of 10,000 kilowatt hours in month	.021	In excess of 100 kilowatt hours in month	.05½

POWER RATES PER KILOWATT HOUR.

TO DISTRIBUTOR.	
First 2,000 kilowatt hours in month	$0.01
For 2,000–3,000 kilowatt hours in month	.007
For 3,000–5,000 kilowatt hours in month	.0055
For 5,000–10,000 kilowatt hours in month	.0053
For 10,000–25,000 kilowatt hours in month	.0051
In excess of 25,000 kilowatt hours in month	.0050
Power in June, July, and August 25 per cent additional to above.	

TO CONSUMER.	
First 100 kilowatt hours in month	$0.05
For 100–200 kilowatt hours in month	.04
For 200–500 kilowatt hours in month	.03
For 500–1,000 kilowatt hours in month	.015
For 1,000–2,000 kilowatt hours in month	.008
For 2,000–5,000 kilowatt hours in month	.007
For 5,000–50,000 kilowatt hours in month	.0063
For 50,000–75,000 kilowatt hours in month	.0060
For 75,000–100,000 kilowatt hours in month	.0057
In excess of 100,000 kilowatt hours in month	.0055
Power in June, July, and August 25 per cent additional to above.	

In developing hydroelectric power for irrigation pumping it has been necessary to meet many popular fallacies concerning the cheapness of water power. It is generally assumed that because the water is flowing more or less continuously throughout the year, making possible a large amount of power, therefore the power itself must necessarily be cheap. Little consideration is given to the large first cost of installation, of development of the power, of the interest on the investment, and particularly to the depreciation.

Few people outside of the profession of electrical engineering understand that the utilization of the natural water power is accompanied by heavy expense, notably in fixed charges for interest and depreciation, and that these may far exceed the more obvious costs of a steam plant. Obsolescence also must be considered, especially in water-wheel development. Great improvements have been made along that line, so important that no up-to-date power-plant manager can ignore taking advantage of them. While in purely electrical apparatus obsolescence is becoming less and less of a large factor, if the plant is properly designed, yet it must be considered. The heavy item and one not usually appreciated is, as above stated, the interest, depreciation, and other fixed charges inseparable from a large capital investment. It is not an uncommon thing for a unit of hydroelectric power generation transmission and transformation at the substation to run into $250 to $300 per kilowatt, while a steam plant in large sizes may not exceed $45 to $60, or at the most $75, per kilowatt. On the other hand, the depreciation of a steam plant and repairs of the same are much in excess of the hydroelectric system as a whole, but this does not modify the fact that it is often cheaper to build steam plants to meet load conditions rather than to furnish it by hydroelectric power. This, as above stated, it is difficult to bring to public comprehension, namely, that electric power developed from water power is sometimes more expensive than the equivalent amount of power developed when needed by economically operated steam or gas engines.

One of the popular misapprehensions which has given rise to considerable disappointment to the settlers on Government projects is the lack of appreciation of the fact that electric energy after being developed must be raised to high voltage for long-distance transmission and again transformed before distribution to the consumer, and that such transforming apparatus is quite expensive.

The farmer, seeing a high-power line skirting his farm, can not readily be made to understand why he can not purchase a small amount of electricity for use on his farm or in his house. It is necessary to explain to him that the difference is almost as great as would be in a case where he might argue that because a tree grows on his land he should be able to get his tables and chairs at relatively small cost. The transformation of a tree into a chair may be as difficult as the transformation of the high-tension electricity into a form such that he can safely use it around his house or barn.

There has also been an exaggeration in the minds of the people in the communities on some of the Government projects of the importance to them of the power plants which have been built in connection with the pumping and related work. They seem to think that these are an asset which they can utilize for more or less speculative purposes and that the earnings of these power plants will notably reduce the cost of the irrigation works and possibly save the water users from any expenditure. They overestimate the earning power of these works, not appreciating that many of them can be operated only during the irrigation season and that electric power developed under these circumstances has small commercial value. They have heard of the great earnings of the water-power monopolies and picture to themselves the advantages of securing a monopoly of this kind which they can handle to their own immediate profit, forgetting that the manufacture and sale of electricity developed by water power is a highly specialized business, like the manufacture of any other commodity and one which is not always financially successful, and only when handled by men of exceptional ability.

As above stated, many of the uses for electric power developed by the Reclamation Service are those in connection with transportation of materials and construction of works. The devices employed are usually standard in design, consisting of light electric railroads, such as are needed in construction of tunnels and in similar work, and apparatus for the operation of cement plants, cableways, hoists, excavating machinery, etc., lighting plants being, of course, an important adjunct.

Pumping, however, forms the great and principal use of the electric power development, and there were installed 9,235 horsepower in permanent pumping plants used in 1913, in addition to numerous small drainage installations semiportable and intermittently used. The cost, including all overhead charges and depreciation, has been estimated to average about 1 cent per acre-foot raised 1 foot, ranging from 0.3 cent per acre-foot at Minidoka upward; that is to say, an amount of water covering an acre 1 foot in depth, or 43,560 cubic feet, can be raised to a height of 50 feet for 50 cents.

In comparison with this, water raised by the ordinary small steam or gasoline pumping plant built by associations of farmers throughout the arid regions is probably costing from 7 to 10 cents per acre-foot raised 1 foot, including, as above stated, interest and depreciation. With better and more economical devices for raising larger quantities the cost may be cut down to 5 cents or even less under exceptional conditions, while those of the Government works, as above stated, may run as low as at Minidoka in 1913, when it averaged 0.346 cent.

Sales of power for commercial and other purposes are made at varying rates, dependent mainly upon the cost of development. As a rule, the electric energy is sold by the Government as nearly as possible at cost. The reason that the cost varies so widely is due primarily to the difference in conditions of development and, secondarily, to the conditions attached to the sale, particularly as to the continuity of demand by the consumer.

The ordinary price, or what may be considered as a standard of the Reclamation Service for current for commercial purposes in large lots, is about 1.5 cents per kilowatt hour. Under extraordinary conditions where excess power is sold whenever developed and is used as an auxiliary for steam power, the price has been as low as 0.75 cent per kilowatt hour, or even 0.5 cent.

In one case in Utah for municipal purposes the Reclamation Service sells at 0.8 cent per kilowatt hour, under a minimum monthly guaranty of $225. The essential feature in these extraordinary low prices is that the Reclamation Service is selling surplus power and that there are two unusual clauses relieving the United States from obligation to furnish power in case it should become inconvenient to do so, as follows:

> The United States shall have the right and privilege to shut down its power plant and cease serving electric energy at any time in order to make necessary repairs or additions to transmission lines, canals, or machinery.

Also it is stated that—

> In case of the shortage of power due to lack of water, or if the demands for power for construction purposes cause the furnishing of power to the city to impede the progress of construction work on the project, the United States reserves the right and privilege to cut off the power until such time as it is possible to furnish power without impeding the progress of construction work.

The rates charged for heating and similar purposes vary widely as above noted, dependent upon there being an excess of energy during the winter season when water is not pumped for irrigation. Not being sold or disposed of for profit, the rates for sale approximate usually, as above stated, nearly the actual cost, these being so low in some cases as to compete with coal at $7 per ton in heating houses and in cooking.

The following figures give in concise form and in alphabetic order by States the power already developed, together with the total proposed or possible power and the output.

Power development[1] *(water power unless otherwise specified).*

Project.	Name of plant.	Maximum head in feet.	Horsepower prime movers.	
			Installed.	Total[2] proposed or possible.
Arizona:				
Salt River	Roosevelt[3]	226	8,640	15,640
Do	South Consolidated[4]	30	2,800	2,800
Do	Arizona Falls[5]	18	1,450	1,450
Do	Crosscut[6]	117	6,000	6,000
Arizona-California:				
Yuma	Drop in California Canal	9	.....	1,000
Do	Araz	25	.....	7,700
California:				
Orland		27	.....	483
Colorado:				
Grand Valley	Main Canal	44	.....	3,600
Uncompahgre Valley		.....	.....	10,000
Idaho:				
Boise	Boise Dam[7]	30	2,550	2,550
Do	Arrowrock Dam	230	.....	17,000
Do	Drops in canals	20–90	.....	4,800
Minidoka	Minidoka Dam[8]	50	10,000	20,000
Kansas:				
Garden City	Deerfield (steam)[9]	.....	700	700
Montana:				
Flathead	Flathead River	60	.....	360,000
Do	Revais Creek	1,000	.....	26,000
Huntley	Main Canal drop[10]	34	286	600
Montana-North Dakota:				
Lower Yellowstone	Lateral K. K. drop	.....	.....	290
Nevada:				
Truckee-Carson	Lahontan[11]	120	1,800	6,000
Do	26-foot drop	26	.....	2,000
New Mexico-Texas:				
Rio Grande	Elephant Butte (steam)[12]	.....	2,000	2,000
Do	Elephant Butte (hydroelectric)	.....	.....	10,000
North Dakota:				
North Dakota Pumping	Williston (steam)[13]	.....	1,550	1,550
Oregon:				
Klamath	Various sites	22–88	.....	9,700
Umatilla	Drainage outfall	28	.....	145
Utah:				
Strawberry Valley	Spanish Fork[14]	125	1,600	3,500
Washington:				
Yakima—				
Sunnyside unit	Drops in canals	20–88	.....	1,800
Tieton unit		.....	.....	3,250
Wapato unit		.....	.....	9,000
Okanogan	Drop No. 1[15]	105	.....	250
Do	Drop No. 2[16]	56	.....	300
Do	Salmon Creek	441	.....	2,800
Total		.....	39,376	532,908

[1] Power may be developed on other projects, but data not completed.
[2] Estimated.
[3] Three 1,680-horsepower and two 1,800-horsepower; five 1,060-kilowatt generators.
[4] Two 1,400-horsepower turbines direct connected; two 1,000-kilowatt generators.
[5] Two 725-horsepower turbines direct connected; two 525-kilowatt generators.
[6] Six 1,000-horsepower vertical tangential wheels; six 875-kilowatt generators.
[7] Three 850-horsepower turbines, direct connected; three 625-kilowatt generators.
[8] Five 2,000-horsepower turbines, direct connected to five 1,400-kilowatt generators.
[9] Two 350-horsepower steam turbines and two 225-kilowatt generators.
[10] Two vertical turbines, direct connected to two 20-inch centrifugal pumps, capacity 28 second-feet.
[11] Two 900-horsepower turbines, direct connected to two 625-kilowatt generators.
[12] Three 625-kilowatt steam turbine units.
[13] Two 300-kilowatt and one 500-kilowatt steam turbine units.
[14] Two horizontal 800-horsepower turbines and two 500-kilowatt generators.
[15] One 250-horsepower turbine; one 187-kilowatt generator.
[16] One 300-horsepower turbine; one 187-kilowatt generator.

At each of the large storage dams built by the Reclamation Service there are opportunities for intermittent power, some of which will undoubtedly be utilized after the country has developed to a higher degree and markets are established.

The capacity, output, and construction cost for each of the more important power-generating plants of the Reclamation Service are given in the following table, together with the output sold and used by the Reclamation Service in its operation:

Power-plant data.

Project.	Name of plant.	Capacity, kilowatts.		Cost.	Output, kilowatt hours. Fiscal year 1913.	
		Rated.	Safe observed.		Sold.	Used by Reclamation Service.
Arizona:						
Salt River	Roosevelt	5,300	6,000	[1] $642,654.23	9,336,802	2,932,230
Do	South Consolidated	2,000	2,000	162,123.05		
Do	Arizona Falls	1,050	1,000	109,500.73		
Do	Crosscut	[2] 5,250		[3]		
Idaho:						
Boise	Boise	1,875	2,400	168,446.05	2,529,422	4,937,031
Minidoka	Minidoka	7,000	7,420	433,887.21	7,342,963	19,511,603
Nevada:						
Truckee-Carson	Lahontan	1,250	1,450	85,437.63	219,544	2,110,127
New Mexico:						
Rio Grande	Elephant Butte (steam).	1,875	1,875	136,491.83	14,825	3,275,285
North Dakota:						
Williston	Williston (steam)	1,150	1,550	228,699.39	436,300	559,003
Utah:						
Strawberry Valley.	Spanish Fork	1,000	1,000	55,531.71	687,780	156,674
Totals		22,500	24,695	2,022,771.83	20,567,636	33,481,953

[1] Exclusive of power canal and diversion dam $1,500,459.01. To the cost of this power plant will be added $83,000 to cover a 5,000-kilowatt unit now being purchased, making a total cost of $725,654.23 and a total rated capacity of 10,300 kilowatts.
[2] Not included in totals.
[3] Incomplete.

SUMMARY OF RESULTS.

The following table gives in concise form many of the items which have been accomplished. A more detailed table will be found in the appendix:

Summary of results, June 30, 1914.[1]

LANDS.

	To June 30, 1913.		To June 30, 1914.	
	Acres.	*Farms.*	*Acres.*	*Farms.*
Service was prepared to supply water to	1,290,107	26,674	1,343,193	27,115
Under contract:				
Water rights	431,457	8,786	416,644	8,559
Rental contracts, etc	510,815	12,168	566,843	12,416
Total under contract	942,272	20,954	983,487	20,975
Available reservoir capacity—acre feet	5,051,210		5,460,510	

CANALS AND DITCHES.

	To June 30, 1913.	To June 30, 1914.
	Miles.	*Miles.*
Canals over 800 second-feet capacity	313	325
Canals 301 to 800 second-feet capacity	471	538
Canals 50 to 300 second-feet capacity	1,206	1,318
Canals less than 50 second-feet capacity	5,538	5,826
Waste water and drainage ditches	433	548
Total canals and ditches	7,961	8,555

[1] It is estimated that the irrigable area of the 28 projects on completion will be about 2,918,600 acres, and will include over 58,000 farms.

Summary of results, June 30, 1914—Continued.

TUNNELS.

	To June 30, 1913.	To June 30, 1914.
	Miles.	*Miles.*
Number	77	86
Length, feet	117,760	129,341

DAMS, STORAGE AND DIVERSION.

	Cubic yards.	*Cubic yards.*
Masonry	868,176	1,346,904
Earth	7,955,067	8,817,236
Rock-fill and crib	700,409	704,784
Total	9,523,652	10,868,924

DIKES OR LEVEES.

Length, miles	82	85
Volume, cubic yards	3,697,228	3,790,950

CANAL STRUCTURES.

	To June 30, 1913.		To June 30, 1914.	
	Concrete.	Wood.	Concrete.	Wood.
Costing over $2,000	576	51	645	75
Costing $500–$2,000	1,152	178	1,264	206
Costing $100–$500	5,715	3,475	5,978	3,748
Costing less than $100	5,044	34,022	5,622	37,087
Total	12,487	37,746	13,509	41,116

BRIDGES.

	To June 30, 1913.		To June 30, 1914.	
	Number.	Length.	Number.	Length.
		Feet.		*Feet.*
Steel	81	5,033	84	5,337
Combination	302	6,910	195	6,094
Wood	2,767	56,325	3,386	70,603
Concrete	191	2,632	210	3,191
Total	3,339	70,900	3,875	85,225

CULVERTS.

Concrete	1,130	47,897	1,120	51,105
Metal	672	16,779	880	26,338
Terra cotta	196	9,679	306	16,191
Wood	1,853	46,080	2,329	54,628
Total	3,851	120,435	4,635	148,262

PIPE.

Concrete	.....	433,212	.....	454,584
Metal	.....	32,287	.....	153,638
Terra cotta	.....	181,339	.....	451,928
Wood	.....	184,149	.....	192,036
Total	.....	830,987	.....	1,252,186

Summary of results, June 30, 1914—Continued.

FLUMES.

	To June 30, 1913.		To June 30, 1914.	
	Number.	Length.	Number.	Length.
		Feet.		*Feet.*
Concrete	28	3,039	29	3,123
Metal	238	74,712	297	90,126
Wood	1,171	323,640	1,264	328,375
Total	1,437	401,391	1,590	421,624

CANALS LINED.

				Miles.
Concrete	[1]	[1]	.....	86.4
Wood	[1]	[1]	.....	1.7

[1] No report.

BUILDINGS.

Offices	65	.....	74	.....
Residences	426	.....	483	.....
Power plants	14	.....	13	.....
Pumping stations	61	.....	63	.....
Barns, storehouses, etc	332	.....	385	.....
Total	898	.....	1,018	.....

WELLS.

Completed	348	[2] 26,237	361	[2] 28,717

[2] Depth in feet.

COMMUNICATIONS.

	To June 30, 1913.	To June 30, 1914.
Roads.....miles..	697	733
Railroads.....do....	51	78
Transmission lines.....do....	351	402
Telephone lines.....do....	2,331	2,376
Phones.....number..	927	1,003

POWER DEVELOPED.

Water.....horsepower..	28,866	29,126
Steam.....do....	3,600	4,250
Total.....do....	32,466	33,376

EXCAVATIONS, ETC.

Class 1, earth.....cubic yards..	87,492,753	100,432,925
Class 2, indurated material.....do....	6,296,118	6,668,156
Class 3, rock.....do....	5,456,897	6,067,391
Total.....do....	99,245,768	113,168,472
Coal mined.....tons..	30,693	39,474
Riprap placed.....cubic yards..	419,790	616,493
Paving placed.....square yards..	511,322	564,037
Concrete placed.....cubic yards..	1,344,908	1,933,263
Cement used.....barrels..	1,533,544	1,965,499
Cement manufactured by United States.....do....	338,452	338,452
Sand cement manufactured by United States.....do....	95,435	597,916

SURVEYS AND EXAMINATIONS.

During the past year no new projects have been started, but general surveys and examinations have been continued or started in order to obtain definite facts concerning matters of importance which influence the present projects or which will be needed in the discussion of additional projects. Most of the fundamental data, especially those relating to topography and water supply are being obtained by the United States Geological Survey, but these are supplemented by more detailed engineering examinations, occasionally in cooperation with States or public bodies.

The largest one of these examinations is that of the Colorado River, with particular reference to possibility of storing the water in reservoirs near the headwaters in Wyoming, Utah, or Colorado for use on lower-lying lands and for possible amelioration of flood conditions on the lower part of the river, and of adjusting claims which will inevitably arise regarding distribution of water to the Government projects and to enterprises in Arizona, California, and in the Republic of Mexico.

In California cooperative surveys have been made with the State and with organizations of citizens interested particularly in the possibility of storing some of the waters of Sacramento River and diverting these on to great areas of agricultural lands in the Sacramento Valley. Many of these lands have been cultivated for years in wheat, and the average production has steadily declined to a point where they are no longer profitable. The success of the Orland unit demonstrates what can be done in the intensive cultivation of these apparently worthless lands when supplied with water for irrigation. The surveys already made indicate that it is practicable to irrigate many thousands of acres similar to those near Orland and to greatly increase their value and productive capacity.

In Colorado a study has been made of the headwaters of the Rio Grande, utilizing the results obtained by the Geological Survey, and with particular reference to the question of the effect of drainage on the seeped lands of San Luis Valley on the water supply of the Rio Grande available in New Mexico and Texas.

In Nebraska an investigation is being made in cooperation with the State Engineer and the president of the Nebraska Conservation Commission to determine the feasibility and approximate cost of works for the irrigation of a considerable area of land in Gosper, Phelps, and Kearney counties.

In Nevada a reconnoissance has been made of the headwaters of Carson River with a view ultimately of developing some of the lands in Carson Valley, or at least considering these in connection with alternative propositions for extending the area of the Truckee-Carson project.

In Oklahoma consideration has been given to the Lawton project and the offer of the city of Lawton to furnish the use of the city reservoir in supplying water for a canal to irrigate about 2,500 acres.

In Oregon cooperative surveys have been conducted with the State officials, these being for the purpose of investigating the opportunities in central Oregon. Also arrangements have been made for study-

ing in cooperation with the State engineer the possibility of water-power development on Columbia River at The Dalles, with a view to pumping water for irrigation and utilizing the excess power for industrial purposes.

In South Dakota a brief examination was made of the surveys conducted by the State engineer on what is known as the Angustura project for storing and diverting water of Cheyenne River on lands southeasterly from the Black Hills.

In Texas a study has been made of Pecos River and the diversions from it, with the intention of extending this work up into New Mexico to obtain data bearing upon the largest and best use of the waters in this interstate stream, particularly with reference to the Government works already executed.

In Washington cooperation has been had with the State in the survey of Palouse River in order to ascertain the feasibility of storing the waters of this stream, this work being in part a continuation and extension of surveys previously undertaken.

SECONDARY PROJECTS.

In addition to the primary irrigation projects which have been approved by the Secretary of the Interior for detailed investigation or for construction, and which are discussed on subsequent pages, a number of secondary projects have been investigated at various times since the organization of the Reclamation Service. The work on the secondary projects has in general been limited to the gathering of information as to water supply and the determination of the character and extent of irrigable lands.

The following secondary projects have been investigated:

Arizona: Little Colorado, San Carlos, and San Pedro.

Arizona-California: Colorado River.

California: Owens Valley, Sacramento Valley, and San Joaquin.

Colorado: White River.

Idaho: Dubois and Port Neuf.

Montana: Clark Fork, Crow Reservation, Lake Basin, Madison River, and Marias.

Nebraska: South Platte.

Nevada: Walker River.

New Mexico: La Plata, Las Vegas, and Urton Lake.

North Dakota: Bismarck, Little Missouri, Nesson, Washburn, and Bowman.

Oklahoma: Cimarron and Red River.

Oregon: Malheur and Central Oregon.

Utah: Bear Lake and Utah Lake.

Washington: Palouse, Priest Rapids, Wapato, Benton, and Kittitas.

Wyoming: De Smet.

Information relative to these projects can be found in preceding reports by consulting the index in the Tenth Annual Report.

LEGISLATION.

The most notable legislation recently enacted is the 20-year extension act, approved August 13, 1914, to which reference has already been made. For convenience of reference this act together with the original reclamation act and others affecting the operations of the Reclamation Service are reprinted in the appendix of this report.

DECISIONS OF THE SECRETARY OF THE INTERIOR.

A digest of the important decisions which have been rendered by the Secretary of the Interior has been given in each of the preceding annual reports. Those rendered during the past year are shown in condensed form in the appendix of this report, together with a few decisions by the Comptroller of the Treasury.

PUBLIC NOTICES AND ORDERS.

During the fiscal year ending June 30, 1914, 14 formal public notices and orders were issued by the Secretary of the Interior in connection with the operation of the projects affected. These notices and orders are printed in the discussions of the individual projects and in addition certain general orders are printed in the appendix.

LITIGATION.

The volume of litigation is increasing, this being inseparable with the development of the work, which at various points necessarily touches upon certain more or less undefined vested rights or interests, or which brings into question the application of questions of law to doubtful cases. The effort is made as far as possible to avoid litigation and to make settlement out of court wherever this can be done without sacrifice of important principles or for an extortionate amount. By adhering to this policy the litigation which is eventually entered into has as a rule been decided in accordance with the contentions of the Government. A review of the litigation is given in the appendix.

PURCHASES OF RIGHTS AND PROPERTY.

Section 7 of the reclamation act provides that where, in carrying out the provisions of the act, it is necessary to acquire any rights or property, the Secretary of the Interior may acquire them for the United States by purchase or by condemnation through judicial process. A total of $106,102.48 was paid during the fiscal year 1914 for the acquisition of such rights and property. The following statement shows, by projects, the amount paid to June 30, 1913, the amount paid during the fiscal year 1914, and the total:

Purchases of rights and property.

Project.	Amount.		
	Total to June 30, 1913.	During fiscal year 1914.	Total to June 30, 1914.
Arizona, Salt River	$699,844.49	$100.00	$700,744.49
Arizona-California, Yuma	94,868.50	16,774.09	111,642.59
California, Orland	116,293.50	7,053.00	123,346.50
Colorado:			
Grand Valley	213,975.00	8,610.00	222,585.00
Uncompahgre Valley	137,002.33	24,346.50	161,348.83
Idaho:			
Boise	347,077.58	3,261.50	350,339.08
Minidoka	51,004.50	5,740.82	56,745.32
Kansas, Garden City	894.00	.....	894.00
Montana:			
Flathead	9,120.97	2,042.81	11,163.78
Huntley	1,029.72	.....	1,029.72
Milk River	35,381.24	15,559.08	50,940.32
Sun River	23,940.29	783.50	24,723.79
Montana-North Dakota, Lower Yellowstone	19,030.47	739.54	19,770.01
Nebraska-Wyoming, North Platte	215,120.25	1,240.60	216,360.85
Nevada, Truckee-Carson	62,173.99	701.99	62,875.98
New Mexico:			
Carlsbad	150,000.00	.....	150,000.00
Hondo	20,000.00	.....	20,000.00
New Mexico-Texas, Rio Grande	259,660.79	.....	259,660.79
North Dakota, North Dakota pumping	2,962.50	287.50	3,250.00
Oregon, Umatilla	33,037.62	739.90	33,777.52
Oregon-California, Klamath	542,390.63	6,264.00	548,654.63
South Dakota, Belle Fourche	49,747.33	260.00	50,007.33
Utah, Strawberry Valley	22,036.88	.....	22,036.88
Washington:			
Okanogan	30,030.52	515.60	30,546.12
Yakima	322,272.35	7,282.05	329,554.40
Wyoming, Shoshone	187,575.42	3,000.00	190,575.42
Total	3,646,470.87	106,102.48	3,752,573.35

A more detailed statement for the fiscal year, giving, by projects, the name of the vendor, a description of the property acquired, the consideration paid in each case, and the date of the deed, will be found in the appendix.

FINANCES.

The financial condition of the service may be summed up in the following condensed statement of total receipts and expenditures. The details of these expenditures are given in the appendix.

The statement of cash receipts and payments appearing below shows that at the beginning of the fiscal year there was $3,218,882.58 of cash on hand, and that during the year this amount was augmented by receipts from various sources to a grand total of $12,111,629.87, and that expenditures during the fiscal year were $10,437,940.81, leaving on hand at the close of the fiscal year $1,411,401.40. In accordance with the plan followed by the General Land Office and the Treasury Department the receipts from sales of public lands are held in the Treasury from six to nine months before they are placed to the credit of the reclamation fund. This has caused the service to draw $3,500,000 from the loan authorized by act of June 22, 1910 (36 Stat., 835). The estimated receipts from the sale of public lands in the hands of the Treasury Department on June 30, 1914, which had not been credited to the reclamation fund amounted to approximately $2,616,000.

The reclamation fund, which includes the moneys received from the sale of public lands, has now reached the total of $81,813,772.71, and from the sale of town sites $262,287.66.

Transfer vouchers, adjusting accounts between the projects for the transfer of the value of services and equipment, amounted to $621,081.49. Since the beginning of the service the value of the transfers of supplies, materials, equipment, and services between projects has amounted to $5,168,878.94. This system of transfers between projects has enabled the service to utilize equipment, materials, supplies, etc., to their fullest extent where needed and to charge the cost where the benefit accrued.

CASH TRANSACTIONS.

Below is shown, in the statement of cash receipts and payments, a summarized exhibit of the cash transactions during the fiscal year 1914:

Statement of cash receipts and payments.

RECEIPTS.

On hand July 1, 1913 (Twelfth Annual Report, p. 39)		$3,218,882.58
Original receipts:		
Public-land sales	$2,610,341.59	
Town-site sales	15,280.25	
Bond loan	3,500,000.00	
		6,125,621.84
Repayment water-right charges		251,679.64
Miscellaneous receipts		2,505,759.08
Collections in project offices not classified		9,686.73
		12,111,629.87

PAYMENTS.

From reclamation fund	$6,936,439.81	
Bond loan	3,500,000.00	
Rio Grande Dam appropriation	1,501.00	
		10,437,940.81
Town-site receipts transferred to credit of projects		262,287.66
Balance on hand to June 30, 1914:		
In Treasury	$249,887.53	
In depositaries to credit of special fiscal agents	1,151,827.14	
In project offices awaiting remittance	9,686.73	
		1,411,401.40
		12,111,629.87

ASSETS, LIABILITIES, RESERVES, AND CAPITAL.

Below is presented a combined statement of the assets and liabilities, together with the reserves and capital, of the Reclamation Service as of June 30, 1914. This statement shows that the cash resources on June 30, 1914, were $20,517,714.67, and that all other resources, exclusive of construction charges and deferred operation and maintenance charges, amount to $6,317,872.43. The gross expenditures for construction work in process amount to $91,664,628.73, comprising the cost of irrigation works as shown in the

statement of construction cost by functional features. From the gross expenditures is deducted all revenue earned during construction to June 30, 1914, amounting to $5,206,018.61, making the net cost of the construction work in process $86,458,610.12. The deferred operation and maintenance charges amount in all to $2,119,850.63. The grand total of assets is therefore $115,414,047.85. The liabilities of the service amount in all to $1,851,212.87. The reserves for repayment to the reclamation fund of the cost of the projects amount in all to $8,133,062.27. (This amount represents only the charges which have been written into the books as accruals, and does not include the contract value of such contracts, which amount to $22,214,410.68.) The capital of the service is represented by the actual receipts from the sale of public lands, amounting in all to $81,813,772.71, plus the estimated amount of $2,616,000 now with the Treasury which has not yet been audited and placed to the credit of the reclamation fund. To this is added the $1,000,000 special appropriation for the Rio Grande Dam (34 Stat., 1357), and the $20,000,000 bond loan authorized by the act of June 22, 1910 (36 Stat., 835), the total capital to June 30, 1914, being $105,429,772. This added to the reserves and liabilities equals the amount shown above as the assets.

Statement of assets, liabilities, reserves, and capital to June 30, 1914.

ASSETS.

I. Cash:		
With Treasurer United States	$249,887.53	
With depositaries to credit of special fiscal agents	1,151,827.14	
Balance of bond loan available for transfer to reclamation fund, act of June 25, 1910 (36 Stat., 835)	16,500,000.00	
Estimated amount with Treasurer United States not yet audited	2,616,000.00	
		$20,517,714.67
II. Collections returnable to fund through Treasury:		
In fiscal agents' possession awaiting remittance	6,597.03	
In other employees' hands awaiting transfer to fiscal agent	3,089.70	
		9,686.73
III. Accounts receivable:		
Uncollected freight refunds	25,956.45	
Uncollected water rentals	157,821.61	
Uncollected miscellaneous rentals	56,041.70	
Uncollected miscellaneous items	231,884.96	
Construction charges due and uncollected from water-right applicants	1,945,768.99	
Operation and maintenance charges due and uncollected from water-right applicants	428,056.88	
		2,845,530.59
IV. Inventories:		
Mercantile stores stock on hand	87,657.22	
Animals	209,719.75	
Mechanical and other equipment	1,846,506.98	
Material and supplies on hand in storehouses	1,231,750.58	
Goods in transit	44,873.36	
Unadjusted transfers between projects	6,675.74	
Undistributed cost (freight and handling on inventory property)	35,471.48	
		3,462,655.11

V. Construction work in process:			
Gross expenditures for construction of projects to date		$91,664,628.73	
Less revenues earned during construction as follows:			
Rentals of cottages	$102,861.75		
Rentals of grazing lands	132,257.38		
Rentals of power and light	517,610.71		
Rentals of irrigation water	2,062,522.76		
Rentals of telephones	11,573.28		
Miscellaneous revenues	93,985.75		
Profits on mess houses	126,476.23		
Profits on mercantile stores	264,541.65		
Profits on hospitals	20,693.95		
Receipts from sale of town sites	262,287.66		
Contractors' freight refunds	171,874.48		
Forfeitures by defaulting bidders and contractors	109,076.15		
Adjustments:			
Depreciation on plant and equipment	1,050,437.84		
Profits shown on Government animals	201,792.93		
Miscellaneous	78,026.09		
		5,206,018.61	
Net expenditures for construction of projects to date			$86,458,610.12
Deferred operation and maintenance charges			2,119,850.63
Total assets			115,414,047.85

LIABILITIES, RESERVES, AND CAPITAL.

VI. Accounts payable:			
Unpaid labor		$364,784.90	
Unpaid purchases		409,064.28	
Unpaid contract estimates		265,021.72	
Unpaid contract holdbacks		174,421.21	
Unpaid freight and express charges		525,543.42	
Unpaid passenger fares		6,905.51	
Unpaid agreements to purchase real estate		56,678.01	
Unredeemed coupon books		4,018.33	
Unredeemed meal tickets		4,253.26	
Unpaid miscellaneous		40,522.23	
			1,851,212.87
VII. Reserves for repayment to reclamation fund of cost of projects:			
Construction charges accrued on contracts with water-right applicants		4,879,874.00	
Construction charges paid in advance by water-right applicants		280,907.96	
Construction charges paid and forfeited by water-right applicants		23,900.83	
Miscellaneous items:			
Construction charges accrued on contracts with Indian Service		2,552,112.63	
Construction charges paid on Jackson Lake enlargement work		396,266.85	
			8,133,062.27

VIII. Capital:			
Reclamation fund	$82,076,060.37		
Less town-site receipts	262,287.66		
		$81,813,772.71	
Rio Grande Dam appropriation (34 Stat., 1357)		1,000,000.00	
Bond loan (36 Stat., 835)		20,000,000.00	
Estimated reclamation fund with Treasurer United States not yet audited		2,616,000.00	
			$105,429,772.71
Total liabilities, reserves, and capital			115,414,047.85

CONSTRUCTION COSTS BY FUNCTIONAL FEATURES.

The statement that follows gives by functional features the amount of money expended in the construction of all storage works, carriage systems, distribution systems, drainage, and other protection systems, power systems, and other construction accounts. The item "Real Estate" in the statement, and in similar statements in the discussion of each project, includes only such lands, rights of way, and buildings not directly chargeable to the other principal features.

Functional feature costs of all projects to June 30, 1914.

Development (storage) works	$28,949,122.93
Carriage systems	29,651,108.09
Distribution systems	15,485,908.88
Drainage and flood protection systems	2,265,103.45
Power systems	5,048,608.72
Real estate	875,381.40
Telephone lines	388,687.10
Farm-unit subdivisions	304,793.31
Roads and bridges	1,429,280.81
Miscellaneous preliminary investigations	3,368,178.17
Operation and maintenance during construction	3,734,456.73
Cost-ledger inventories	163,999.14
Total	91,664,628.73

OPERATION REVENUES AND EXPENSES.

There follows a combined statement giving the revenues and expenses for the operation of projects which have been opened by public notices of the Secretary of the Interior. These revenues and expenditures are those resulting from operations connected with the lands thrown open to water-right applicants by these public notices and do not include the transactions resulting from the temporary operation of canals during the construction period.

Combined statement of operating revenues and expenses to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$372,160.66
Maintenance	317,132.29
Carriage systems:	
Operation	260,611.76
Maintenance	547,503.47

Distribution systems:	
Operation	$663,293.67
Maintenance	1,174,477.80
Drainage and flood-protection systems:	
Operation	13,681.21
Maintenance	643,349.93
Undistributed expenses:	
Operation	161,063.10
Maintenance	543,336.94
Supplemental construction	308,557.25
Total	5,005,168.08

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	2,408,134.90
Operation and maintenance charges paid in advance by water-right applicants	11,757.12
Operation and maintenance charges paid and forfeited by water-right applicants	7,623.37
Rentals of lands and buildings	13,516.42
Rentals of power and light	76,887.18
Rentals of irrigation water	300,111.80
Miscellaneous revenues	67,286.66
Deferred operation and maintenance charges (carried to debit side of assets and liabilities statement)	2,119,850.63
Total	5,005,168.08

REPAYMENT CONTRACTS.

The development of the projects has resulted in water-right applications or contracts that have been entered into with settlers, providing for repayment to the Government of the cost of constructing the works for irrigating their lands. These contracts, under provisions of the reclamation law, require complete repayment of construction charges in 10 annual installments, but the reclamation extension act gives such of those as accept its terms and to those not now under such contracts the right to repay in 20 years in annual installments so graduated as to place upon the irrigator a minimum burden during the early years of farm development. On 16 projects the lands have been opened to entry and settlement and the construction charges fixed by public notice. Contracts for repayment on the 10-year plan total $22,214,410.68. Of this amount, there has been collected $3,186,644.80, of which $128,185.39 was represented by cancellation of so-called "cooperation certificates," issued in payment of construction work. The present value of all contracts is $19,027,765.88.

There are still large acreages of land on most of the projects to which the service is now ready to furnish irrigation water, and which are being taken up from day to day and new contracts signed. On all of the projects the present net investment of the Government exceeds the asset value of the contracts. When all of the lands susceptible of irrigation are covered by contract the value of the contracts should equal the amount of the total investment. It is to be noted in this connection, however, that on several of the projects additional investment will be necessary to make all of the lands irrigable.

ESTIMATED COST OF CONTEMPLATED WORKS.

It is estimated that there will be expended during the fiscal year 1915 the sum of $20,000,000. The following table gives the tentative distribution of this amount to the various functional features. The details are given under a similar heading for each project.

Estimated cost of contemplated work on all projects during fiscal year 1915.

Development (storage) works	$6,418,182.00
Carriage systems	5,046,064.07
Distribution systems	3,677,672.75
Drainage and flood-protection systems	1,606,039.92
Power systems	347,682.00
Real estate	118,623.00
Telephone lines	34,946.00
Farm-unit subdivision	61,600.00
Roads and bridges	78,600.00
Miscellaneous preliminary investigations	236,214.16
Operation and maintenance during construction	1,046,601.11
Operation and maintenance under public notice	915,774.99
Cost-ledger inventories	62,000.00
Washington office administrative expense	350,000.00
Total	20,000,000.00

ENGINEER'S WORK-ORDER SYSTEM.

During the past year the work-order system has been developed in many of its details. This system is designed to bring together, by means of suitable blanks and appropriate accounts, for convenience of reference and control, the authorization and apportionment of funds allotted for the construction and operation of the various projects of the service.

COST OF INVESTING THE RECLAMATION FUND.

One of the strongest reasons supporting the policy, inaugurated by the present administration, of rushing construction work to completion as rapidly as possible exists in the overburden of general expenses.

An organization has been perfected for carrying on the work of the Reclamation Service. The fixed charges consequent upon this organization are approximately the same whether the total of all other expenditures is five millions or twenty millions. There is a slight increase in the total of general expenses from year to year resulting from promotions, and directly attributable in a degree to increased expenditures. But as a rule it may be said that the ratio of general expense to all other expenditures is in inverse ratio to the increase of such other expenditures. This fact is plainly and indisputably demonstrated in the accompanying table wherein the general expense of the Reclamation Service is compared to the total of all other expenditures by calendar years.

It is particularly noticeable that in those years in which the highest rate of progress was made in construction work, when the most money was expended, the ratio of general expenses was the lowest. Thus in 1907 the ratio of general expense was less than 4 per cent, while in 1911 it was nearly 9 per cent.

But the better illustration of the underlying truth lies in two years—1912 and 1913. In the latter year the total of general expenses was actually reduced $38,482 from those of 1911, yet the ratio of general to all other expenses was increased by 0.58 per cent. By present indications the ratio of general expense to all others in the calendar year 1914 will fall below 6 per cent, due to an increase of nearly 100 per cent in gross expenditures.

In other words, while in 1907 it cost only $3.56 to spend each $100 of the $14,000,000 spent, in 1908 it cost $6.48 to spend each $100 of the $10,000,000 spent; in 1912 it cost $9.27 per $100 to invest $9,991,597.54; and in 1913, $9.85 to invest each $100 of the $9,012,503 invested; in 1914 it will cost less than $6 per $100 to invest $20,000,000.

The policy of rapid construction to completion means economy. A matter of $5 additional on every $100 is a matter of grave import to the man who has to repay this money to the reclamation fund. To dole out only $7,000,000 a year for the completion of these projects will mean an added burden of cost of from $5 to $8 on every $100 the water user is compelled to repay.

Statement showing, by calendar years, the gross expenditures from the reclamation fund, less general expense; the total estimated amount of general expenses of the service; and the ratio of general expenses to all other expenditures.

Calendar years.	Gross expenditures exclusive of general expense.	Estimated general expense.	Ratio of general to all other expenditures.
1902	$73,082.68	$25,898.69	35.44
1903	548,962.31	141,212.31	25.72
1904	2,507,520.05	176,787.69	7.05
1905	4,911,053.92	206,188.98	4.20
1906	9,771,343.09	518,369.16	5.30
1907	14,394,642.62	511,800.69	3.56
1908	10,065,624.03	652,322.54	6.48
1909	9,635,378.30	661,201.39	6.86
1910	9,328,015.62	696,818.82	7.47
1911	10,035,129.16	878,878.97	8.76
1912	9,991,597.54	925,960.05	9.27
1913	9,012,503.83	887,478.60	9.85
Total	90,274,853.15	6,282,917.89	6.96

PURCHASE AND TRANSPORTATION OF MATERIALS.

In order to secure the highest practicable economy and bring about uniformity in methods it has been found desirable to make most of the purchases through a central office located as near as possible to the principal manufacturing and jobbing districts and also at the center of transportation facilities. For this reason an office has been maintained for a number of years in the Federal Building in Chicago, with facilities for advertising and purchasing supplies and for forwarding these over the most economical and expeditious route. The total number of purchases of supplies for field use during the past year was 3,116, at a cost of $471,446.28. The cash discounts received by prompt payment of bills, frequently amounting to 2 per cent for payment within 10 days, amounted to $4,604.28. In settling freight claims a deduction is made usually on account of special rates given to the Government by most of the railroads.

The saving on this account for the past year amounted to $379,457.50. Special concessions on freight rates from important shipping points to points of delivery on various projects were granted by the following companies during the fiscal year: Atchison, Topeka & Santa Fe Railway Co.; Chicago, Milwaukee & St. Paul Railway Co.; Colorado Midland Railway Co.; Denver & Rio Grande Railroad Co.; Oregon Trunk Railway Co.; Spokane, Portland & Seattle Railway Co.

On July 1, 1913, the unsettled bills for freight and express charges amounted to $50,346.24. There were received during the fiscal year for administrative examination bills amounting to $652,535.92, and bills amounting to $573,725.97 were examined and bases for settlement arranged with the claimants, leaving outstanding June 30, 1914, $129,156.19. Claims made by the transportation companies on freight and express charges settled during the fiscal year amounted to $573,725.97, and the amount due thereon, after examination at the transportation office, was $547,705.99. The commercial charges on these bills would have been $927,163.49.

During the fiscal year there were filed with the various transportation companies claims amounting to $18,489.97 on copies of expense bills covering shipments consigned to contractors on the several projects, and during the same period the transportation companies remitted on account of these contractors' shipments the sum of $12,415.31, which was covered into the reclamation fund.

The following table gives general data regarding freight and express charges since 1906:

Freight and express charges, 1906 to 1914.

Year.	Bills settled.	Commercial charges.	Deducted on account of freight contracts, etc.	
			Total.	Per cent.
1906–7	$278,782.10	$470,863.26	$192,081.16	40.8
1907–8	369,583.04	577,830.42	208,247.38	36.0
1908–9	778,047.12	1,403,970.10	625,922.98	44.5
1909–10	437,032.61	758,808.76	321,776.15	42.4
1910–11	405,360.55	666,876.59	261,516.04	39.2
1911–12	610,740.23	1,055,733.27	444,993.04	42.1
1912–13	481,118.91	837,077.59	355,958.68	42.5
1913–14	547,705.99	927,163.49	379,457.50	40.9
Total	3,908,370.55	6,698,323.48	2,789,952.93	41.6

ELECTRICAL AND MECHANICAL ENGINEERING.

In order to expedite the more technical and difficult electrical and mechanical operations on the various projects and to secure maximum economy, it has been found desirable to have located, at a convenient point in the West, the headquarters for operations of this kind. Suitable office accommodations have been had in the Federal building at Los Angeles, and there has grown up under Mr. O. H. Ensign's care the electrical and mechanical branch of the service. This is organized and equipped for the purpose, among others, of advising the principal officers of the service in a general way concerning all electrical and mechanical problems.

The principal work is in connection with the development of power and pumping systems for irrigation and drainage purposes, while the next important problem has been in connection with the design of outlet works for large reservoirs. The office also makes purchases of construction equipment involving the use of power and advises in a general way in the layout of construction plants. In the development of hydroelectric systems, primarily for construction purposes and pumping, there is generally a demand to construct power plants beyond the immediate needs of these two uses, and where the sale of excess power would result as an asset to the project this has been done, in some instances resulting in a direct source of revenue for reducing the costs.

In carrying on this work the method of procedure differs somewhat from the usual steps leading up to the development of hydroelectric power plants in commercial practice. Such developments are usually promoted by persons who appreciate the business opportunity made possible by the utilization of a certain water power and who may not grasp fully all of the essential features leading up to the successful and economical operation. They, as a rule, are more interested in the financial transactions than in the real economical delivery of power, so far as the greatest good to the greatest number is concerned.

With the Reclamation Service the initiation is in the hands of engineers whose prime object is to be certain of the economic and operating results, their greatest reward being in the reputation acquired by the successful operation of such plants. In private practice a considerable expenditure in connection with power-plant development is made up of (*a*) promotion expenses, (*b*) costs incidental to the sale of bonds, (*c*) outlay in connection with the sale of stock, including sometimes gratuities. Thus it often results that a water-power scheme is financed and securities sold to an amount far above that necessary to build the works. Nothing of that sort enters into the costs of hydroelectric development in connection with Government operations. The work from its inception to its completion, and later in operation, is in the hands of trained engineers, who are constantly in the public eye and open to criticism, and by this, as well as the desire to hold a good reputation, they are spurred to build permanent and economical works. Along this line there is coincident the desire of manufacturers to meet the extreme requirements of efficiency and operating conditions in plants of a more or less public character built under Government auspices. The specifications are more strictly drawn and lived up to, probably, than they are in commercial practice.

This organization has been able to construct a number of installations that are interesting from the standpoint of first cost and operating cost. For instance, at Minidoka, Idaho, up to the year ending January 1, 1914, the complete investment on the project was $1,124,208.14 for all the construction work in connection with a system supplying power, pumping, and commercial service, including a 7,000-kilowatt power plant at 46-foot head and three large pumping plants of capacity of 575,500 and 375 second-feet, respectively, at 30-foot lift. These plants alone absorb a maximum power demand of 6,550 kilowatts, a number of small drainage and pumping plants,

substations for supplying the towns on the project with commercial light and power, and transmission lines to cover this whole territory, which includes 50 miles of high-tension lines. The operating cost of the system, including upkeep of ground, buildings, and all other costs entering into operation and maintenance, is as follows:

	Cents.
Cost of kilowatt hour generated at plant on load factor per year of 39.9 per cent	0.0624
Cost of operation of three large pumping plants mentioned for the year for power operation and maintenance is per acre-foot per foot of lift	0.294

The average lift of each plant is about 29 feet.
The average combined lift of plants is 68.3 feet.

In the pumping plants of this project during the past year pumps that were purchased seven years ago have been reconstructed under the direction of this office by installing new impellers and making certain other modifications indicated necessary by physical test which raised individual pumps from a rated capacity of 125 second-feet against 30-foot head and manufacturer's efficiency of 72.6 per cent to a new capacity of 166 second-feet and 81 per cent efficiency, thus giving increased capacity and higher economy in operation of plant. The cost to irrigators on the project of water at an average lift of 68.3 feet to a distributing system supplying about 50,000 acres for 1912 was $2.11 per irrigable acre. On this project a sale of the surplus power out of the irrigating season is returning a large revenue, current being used for heat, lighting, cooking, and all manner of commercial purposes.

Some interesting developments in individual cases might be worth mentioning, as, for instance, in connection with centrifugal pumps. When the Reclamation Service began to investigate pumping for irrigation a centrifugal pump could not be purchased of high efficiency and desirable characteristics for alternating current constant speed motors. This office investigated the subject and prepared specifications, insisting on such characteristics, which resulted in the development and purchase of pumps giving a high efficiency over a wide range of head at constant speed—a very desirable thing when pumping from wells. Such pumps have been in operation in Arizona for four years, and recent tests show a combined efficiency from power input to motor from water surface to water surface for water horsepower delivered of 65 per cent. These pumps will continue for many years to hold approximately this result and sustain it with at least 25 per cent variation in head.

At the Roosevelt power plant water wheels have been purchased and put in successful operation under heads varying from 90 to 226 feet, with a high over-all efficiency under these conditions and a desirable capacity at low heads. This work has been accomplished within the range of reasonable cost in spite of the restrictions necessarily imposed by doing work under Government authority. It is believed that the methods of procedure involved in connection with purchases by this bureau are conducive to low prices, to the satisfaction of the many bidders, and to good working arrangements, including public advertising, open bidding, and awarding in strict accordance with the terms of the specifications to the lowest and best bidder.

In dealing with the sale of power to communities so far it has not been thought desirable for the Government to retail power, and where previous contracts or franchises have not existed the service has sold the power to the distributing companies and in most cases controls the rates of such distributer. To broadly summarize the whole matter, certain advantages of doing work under such an organization lie in the fact that the engineering problems are solved with the one aim in view of making the maximum development of any resources at a minimum cost. This is assisted by the condition that costs of promotion in financing are eliminated. Further, the engineer is not influenced by the individual wishes of the financiers as to selection of apparatus and method of development. In the sale of power to a community under Government methods the resulting cost to the consumer does not contain the items mentioned above of promotion and financing costs, but only those concerning operation and maintenance, depreciation, and a sinking fund. Hence it is possible to serve a district at a cost which would be a minimum for the water power developed.

UNIT PRICES UNDER FORMAL SPECIFICATIONS.

It is a matter of common remark, unsupported usually by specific facts, that the Government pays more for materials than do the ordinary corporations and business men. To disabuse the mind of the public on this point, it has been customary to print in the annual report bids for various items of work so as to make readily available the facts as to the amount actually offered and paid. The table in the appendix gives the principal unit prices bid for work and materials and contract unit prices therefor in connection with formal specifications proposals for which have been received by the Reclamation Service during the fiscal year ending June 30, 1914. In almost all cases contracts have been awarded to the lowest bidder, but as the contracts have been awarded on definite divisions of the work as a whole it has frequently happened that the contract price for a particular item is higher than the lowest bid on that item. Unit bids and contract prices for cement, explosives, headgates, machinery, and electrical equipment are not included in the table referred to.

CEMENT TESTS.

One of the largest items of direct purchase by the Reclamation Service is Portland cement. This manufactured product varies materially in quality not only between the various mills making it from different raw materials but even from the same mill. The product may change from hour to hour and to a degree which requires continual vigilance to maintain a definite standard. In making purchases, therefore, it is necessary to require that the product shall meet certain tests, and that these must be applied at short intervals or to each lot delivered. On account of the great importance of securing a uniformly high quality of cement, it has been found desirable to have a laboratory under direct control of the service. This is located near the office of the supervising engineer in Denver, and is in charge of Mr. J. Y. Jewett, cement expert, who states that the amount of cement for which tests were made during

the fiscal year ending June 30, 1914, was 404,885 barrels, of which 391,135 barrels were accepted and 13,750 rejected. The following table shows the number of barrels for which tests have been made and the amount and per cent accepted from 1904, when the testing laboratory was opened, to June 30, 1914:

Cement tested.

Year.	Amount for which tests were made.	Accepted.	
		Amount.	Per cent.
	Barrels.	*Barrels.*	
Jan. 1, 1904, to June 30, 1906	160,044	146,602	91.6
Year ending June 30—			
1907	197,321	191,204	96.9
1908	147,554	137,526	93.2
1909	196,097	163,733	83.5
1910	140,293	127,743	91.1
1911	93,986	88,986	94.6
1912	160,553	149,303	92.9
1913	181,653	170,473	93.8
1914	404,885	391,135	96.6
Total	1,682,386	1,566,705	93.1

All cement purchased during the fiscal year ending June 30, 1914, has been purchased under the United States Government specifications for Portland cement issued under date of May 1, 1912, and the methods of testing employed in the laboratory have conformed with those provided for by these specifications. In the appendix will be found a table giving the average results of all tests on accepted cement from January 1, 1904, to June 30, 1914.

Regular sets of long-time tests have been continued and occasional chemical analyses have been made as a matter of record on all brands of cement under test. Other general work has included sand and sand-cement tests for various projects; water analyses for various projects, continuation of tests and analyses in connection with the investigation of the action of alkali on cement concrete; and miscellaneous tests and analyses as required.

That the maintenance of a cement-testing laboratory is in accord with good engineering practice is evidenced by the various engineering works in connection with which such laboratories are or have been maintained. This laboratory has been a pioneer in this line in the western field and has followed the development of the cement industry in advance of any general development of commercial testing in this field. While there are various commercial concerns now operating in this section, the work of this laboratory, as now organized, covers the whole field in a more comprehensive way than any of these. Under the present system the work is carried on under one organization by experienced men who take a direct personal and not merely a commercial interest in it, and who, through making a study of the conditions prevailing at the various plants, can plan the work along lines of operation best suited to each individual case. Another feature worthy of note has been its influence, as representing a branch of the Government service, in promoting the testing of materials and in bringing about the adoption of standard specifications for these materials.

In addition to the routine work of cement testing and shipment, a laboratory of this kind can perform a large amount of useful work of a miscellaneous nature, such as long-time cement tests; the testing of concrete aggregates, which is coming to be recognized as of equal importance with the testing of cement in high-grade concrete construction; the making of water analyses and miscellaneous chemical analyses, including such as those connected with the investigation of the alkali problem; the carrying out of a series of tests such as that which preceded the adoption of the sand-cement process, etc., all of which general work, with the laboratory once organized, can be performed at much lower cost than it could be obtained elsewhere. As an example of the value of the records established and the experience gained in connection with this miscellaneous work, a recent instance may be noted in which tests were called for by the Grand Valley project on a sample of stone proposed for use as a sand supply, the suitability of which for this purpose was under question. In reporting on this sample, records were available of long-time tests on similar grades of material from other projects, these in one case running to the 7½-year period on similar material from the Uncompahgre project.

With a laboratory once organized and the overhead charges fixed within fairly definite limits, the unit costs depend largely on the volume of work handled. Under the rate of shipment prevailing during the present year the unit cost of the routine work, without taking into account the general work referred to above, has been lower than the prices charged for similar work by commercial laboratories.

In connection with the investigation of the action of alkali on cement, it has been clearly established that Portland cement concrete is subject to attack and disintegration through seepage action of alkaline waters containing sulphates in solution. The obvious remedy is the production of a rich, dense concrete, impervious to such percolation. The best mixtures and materials to be used for this purpose is a matter to be determined by field experiments whenever funds are available for carrying out a series of these experiments on a broad and comprehensive scale, such that definite conclusions can be deduced therefrom.

With regard to decrease of tensile strength on long time tests, the records of such tests show that the modern rotary kiln Portland cements as a general rule (subject to variations in individual cases) develop an increase in tensile strength up to periods ranging from three months to one year, followed by a moderate decrease at later periods, which is more marked on the neat specimens and less marked on the sand mortar specimens. It is not definitely known whether compressive tests would show the same falling off in strength at these periods or whether this is due merely to an increased brittleness of structure which manifests itself under tensile strain, but does not indicate a real loss of strength in the material. A series of compressive tests along this line would furnish a desirable addition to our knowledge of the subject.

In connection with the development of the process of cement manufacture during the period in which this laboratory has been in operation, it may be noted that with the introduction of improved grinding machinery there has been a marked improvement in fine-

ness of grinding, with resulting development of higher strength in the finished product. The importance of finer grinding of the raw materials as tending to eliminate so-called "unsoundness" in the finished product, and to promote a better combination of the materials during the process of burning, has come to be more generally recognized than formerly. There has been a gradual development toward standardization of product coincident with the general adoption during recent years of the cement specifications of the American Society for Testing Materials as a standard for this material throughout the country.

PERSONNEL.

On June 30, 1914, the force of the Reclamation Service comprised 7,998 persons, subdivided as follows: Secretary's appointees, 534; registered employees, 1,527; laborers, etc., employed temporarily and locally on the various projects, 5,937. In addition, the employees of contractors working on reclamation projects numbered 1,058. A more detailed statement, giving the administrative personnel of the service and the number of employees by projects, classified as above, will be found in the appendix.

Injuries to employees.—Under the terms of the compensation act of May 30, 1908, 403 injuries to employees were reported during the calendar year 1913, the corresponding figure for 1912 being 459. In 1913 claims for compensation were allowed in 217 of the cases of reported injury, or 53.8 per cent, and in 1912 in 230 cases, or 50.1 per cent. The average compensation paid for injuries received in 1912 amounted to $206.80, as compared with $187.42 in 1911. Payments have not yet been completed for injuries received in 1913. Further detailed statistics showing the number of injuries reported, claims allowed, and compensation paid, by projects, since 1908, will be found in the appendix.

Inoculation with typhoid prophylactic.—Since July, 1912, when arrangements were made with the Surgeon General of the Army to furnish the Reclamation Service with specified quantities of typhoid prophylactic, as requested, nearly 1,900 complete treatments have been sent to the field. Of these nearly 1,200 were sent during the past fiscal year. Reaction reports have been received from 700 employees, but this does not represent all who have taken the treatment. In many cases the employees were inoculated by local physicians and it was not possible to secure reports from them. During the fiscal year reports regarding the reactions noted after inoculation were received from 431 cases. These are summarized in the following table:

	Number of patients.	Reaction.			
		Absent.	Mild.	Moderate.	Severe.
First dose	431	282	129	18	2
Second dose	383	247	109	24	3
Third dose	346	264	67	13	2
Per cent:					
First dose	100	65.4	30.0	4.1	.5
Second dose	100	64.5	28.4	6.3	.8
Third dose	100	76.3	19.4	3.7	.6

Following the first dose the reactions were either absent entirely or mild in character in 95.4 per cent of the cases, after the second dose in 92.9 per cent, and after the third dose in 95.7 per cent.

A few sporadic cases of typhoid fever developed during the year, but in every case the evidence appeared conclusive that the disease had been contracted prior to employment in a reclamation camp.

DISCUSSION OF PROJECTS.

(A brief statement of the origin of each project and of the preliminary investigations made and a concise description of the construction work completed prior to July 1, 1910, may be found in the ninth annual report. For principal current contracts, data for complete projects, and results to June 30, 1913, see appendix.)

ARIZONA, SALT RIVER PROJECT.

C. H. Fitch, project manager, Phoenix, Ariz.; Oro McDermith, assistant project manager.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Maricopa and Gila.

Townships: 2 S. to 3 N., Rs. 1 to 6 E. and 1 W., and Tps. 3 to 5 N., Rs. 11 to 14 E., Gila and Salt River base and meridian.

Railroads: Santa Fe, Prescott & Phoenix; Arizona Eastern.

Railroad stations and other towns, showing estimated population January 1, 1914: Phoenix, 23,600; Mesa, 3,000; Glendale, 1,200; Tempe, 2000; Chandler, 300; Peoria, 300; Gilbert, 50; Scottsdale, 50; Higley, Lehi, and Tolleson.

WATER SUPPLY.

Source of water supply: Salt and Verde Rivers and wells in various parts of the valley.

Area of drainage basins at Granite Reef Dam: Salt River, 6,250 square miles; Verde River, 6,000 square miles.

Annual run-off in acre-feet: Salt River at Roosevelt (5,760 square miles), 1889 to 1913, maximum, 3,226,000; minimum, 154,000; mean, 773,810. Verde River at McDowell (6,000 square miles), 1889 to 1913, maximum, 1,850,000; minimum, 117,000; mean, 561,509.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season 1914: 187,000 acres. (This amount consists of 169,000 acres of private and homestead lands contracted with the Water Users' Association, 10,000 acres of cultivated school lands, and 8,000 acres under town sites.)

Area under rental contracts, season 1914: 186,000 acres.

Length of irrigating season: From October 1 to September 30—365 days.

Average elevation of irrigable area: 1,200 feet above sea level.

Average annual rainfall on irrigable area: 30-year period, approximately 8 inches; calendar year 1913, 5.39 inches. Dry year.

Range of temperature on irrigable area: 22° to 117° F.

Character of soil of irrigable area: Sandy loam, with clay in places.

Principal products: Alfalfa, grain, cotton, semitropical fruits.

Principal markets: Phoenix and other Arizona towns, Pacific coast cities, and eastern markets.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands are being irrigated under rental contract.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun: 1902.

Construction recommended by the director: March 7, 1903.

Construction conditionally authorized by Secretary: March 14, 1903.

Grand, Water Power, Salt River Valley, Maricopa, and Joint Head Canals purchased: June 15, 1906.

Power Canal completed: October, 1906.

Irrigation by the Reclamation Service begun: May 15, 1907.
Granite Reef Dam completed: August, 1908.
South Canal completed: June, 1909.
Eastern Canal completed: December, 1909.
Roosevelt Dam completed: February 5, 1911; formal dedication March 18, 1911.
San Francisco pumping plant completed: October, 1911.
Western Canal completed: February, 1913.
Highline pumping plant put in operation: June, 1913.
Raising of spillways, Roosevelt Dam, completed: August, 1913.
Joint Head Dam completed: March, 1914.
Project 96.3 per cent completed May 31, 1914. (Based on authorized expenditures to Dec. 31, 1914.)

IRRIGATION PLAN.

The irrigation plan of the Salt River project provides for the storage of water in the reservoir created by the building of the Roosevelt Dam, which is situated at the confluence of Tonto Creek and Salt River, about 78 miles northeast of Phoenix, Ariz. This stored water is carried down Salt River to a point about 4 miles below the mouth of the Verde River, where, together with such water as may be discharged by the Verde, it is diverted to the North and South Side Canal systems by the Granite Reef Diversion Dam. The water supply for the canals on the north side of the river is further augmented by the water diverted by the Joint Head Diversion Dam.

There have been completed and put into operation eight pumping plants with an approximate capacity each of 10 second-feet. A pumping plant located at the junction of the Western Canal and Kyrene branch pumps water through a 54-inch pressure pipe 5,930 feet long to an elevation of 40 feet and waters approximately 7,500 acres of land. The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The United States Reclamation Service now operates and maintains 715 miles of canal and lateral system on the Salt River project.

A power plant located at Roosevelt generates power from stored water in the reservoir and from water delivered from the Power Canal, heading at a diversion dam in Salt River, 19 miles above the storage dam. Other power plants completed and in course of construction by the water users' association, and which will ultimately become a part of the project, are the South-Consolidated, the Arizona Falls, and the Cross Cut. A portion of the power developed will be used for pumping water for irrigation and the remainder for industrial purposes.

The principal features completed are the Roosevelt Dam, Granite Reef Dam, the main canals of the distributing system, and practically the power system. There remain to be done the final unit of the Roosevelt power plant, about 3 miles of Arizona Canal, a few structures on the main canals, the laterals necessary to connect up the pumping plants, the enlargement of the Wallace feeder, and the completion of the McQueen well.

CONSTRUCTION DURING FISCAL YEAR.

Roosevelt Dam.—During July and August the spillways of the Roosevelt Dam were raised 5 feet in height, giving an increased capacity to the reservoir of 83,100 acre-feet.

Pumping plants.—Battery C was completed and the reequipment of McQueen well carried on. Pumping this well for irrigation has, however, delayed its completion.

Transmission lines.—The Mesa-Roosevelt transmission line was reconstructed, having been converted into a suspension type, long span line. The Inspiration Consolidated Copper Co. completed its line under contract of August 2, 1912, and power was turned on March 21, 1914.

Canals.—Very little work was done on the canal systems during the fiscal year. Under contract with H. M. Lewis, excavation of lateral 20 of the Arizona Canal was completed and the tail structure

of the canal was put in, besides some minor structures. The Consolidated Canal spillway below the South-Consolidated power plant was constructed by Government forces, and a large amount of survey work was done in connection with the Wallace feeder of the Western Canal system.

Diversion Dam at Joint Head.—The Joint Head Dam, located in Salt River, about 2 miles west of Tempe, was completed during the year. It is a concrete weir 600 feet long and diverts about 100 second-feet of water into the Joint Head Canal.

Water Users' Association work.—The construction of the Cross Cut power house under contract with Martin & Gillis is rapidly nearing completion and the plant will probably be ready to operate by October. The pressure pipes connecting the new Cross Cut Canal with the power plant were completed.

OPERATION AND MAINTENANCE.

Irrigation works operated during the fiscal year 1914 included the Roosevelt Reservoir, Granite Reef Dam, Joint Head Dam, the Arizona, Grand, Maricopa, and Salt River Valley Canals on the north side of the Salt River, the South Canal, Consolidated, Mesa, Eastern, Highline, Western, and San Francisco Canals on the south side of the Salt River. In addition, water was pumped from the batteries A, B, C, D, E, F, Clemans, and San Francisco wells in connection with the water distribution on the south side of the river. Water was supplied to the canals on the north side through the Arizona Canal and the Joint Head. On the south side gravity water was furnished through the South Canal. The total area irrigated with water supplied through the canals of the United States Reclamation Service is approximately 186,000 acres, an increase over that of last year of 23,000 acres. About 12,000 acres lying under the Tempe Canal were supplied with water through the South Canal, operated by the Reclamation Service. The Tempe Canal is an independent organization and the water was supplied to the head of their canal. For the year ending June 30, 1914, there were diverted through the canals of the Reclamation Service 820,751 acre-feet, of which approximately 533,488 acre-feet were actually applied to the land. On July 1, 1913, the elevation of the surface of the reservoir was 151.07 feet, representing a storage of 414,561 acre-feet of water. The maximum point reached was on that day. The minimum was 108.06 feet, representing a volume of 140,833 acre-feet on November 15, 1913. On June 30, 1914, the elevation of the reservoir was 123.60 feet, representing a storage of 219,283 acre-feet, a net loss at the end of the fiscal year of 27.47 feet in elevation and a volume of 195,278 acre-feet.

Operation and maintenance work has consisted almost entirely of removing sediment from canals and laterals, cleaning the weed growth along the banks, cleaning moss from the beds of the canals, and repairing existing structures. Water has been run in all the canals during the entire year. The total length of canals and laterals operated by the Reclamation Service during the year ending June 30, 1914, was 715 miles, of which 405 miles are on the north side and 310 on the south side of the Salt River. All the pumping plants were operated continuously as far as possible and materially augmented the supply available for irrigation.

The average run-off of the year has been less than normal and as a consequence there has been but a limited supply of water available for irrigation. On account of the limited amount of reservoir water, a basis of distribution was adopted allowing 1 acre-foot per acre of reservoir water for each acre of land in cultivation on the project. Early in the summer of 1914 it was found that this 1-acre-foot per acre of reservoir water would not mature certain of the valuable and perishable crops, such as cotton, melons, cantaloupes, etc., so an additional 10,000 acre-feet was sold at an advanced price to water users having such crops and requiring a small amount of water to mature the crop. This water was charged for at the rate of $1.25 per acre-foot. Other water has been furnished on the acre-foot basis at the same rates as last year, which were $1.10 for the first 2 acre-feet, 40 cents for the third acre-foot, 50 cents for the fourth acre-foot, and 60 cents for anything furnished over 4 acre-feet per acre of land signed in the association; and for land not signed in the association, $1.20 for the first 2 acre-feet, 50 cents for the third, and 60 cents for all over the third acre-foot. On account of the limited supply of water the average use of water has been low and the duty of water correspondingly high.

Historical review, Salt River project.

Item.	1909	1910	1911	1912	1913	1914 (estimate).
Acreage for which service was prepared to supply water	130,000	150,000	160,000	160,000	190,000	187,000
Acreage irrigated	75,638	92,251	115,042	128,628	163,312	186,000
Miles of canal operated	464	499	534	576	715	715
Water diverted (acre-feet)			551,093	663,256	770,063	650,000
Water delivered to land (acre-feet)	420,000	382,000	352,699	430,928	462,037	390,000
Per acre of land irrigated (acre-feet)	4.2	3.6	3.53	3.94	2.97	2.10

SETTLEMENT.

During 1914 the tendency has been toward the cutting up of the large farms and dividing them into smaller holdings of 10 to 20 acres. This has brought a number of families into the valley who are now living on the land. There has also been a marked increase in the number of cooperative organizations, principally for the sale of produce. This is especially true of the Farmers' Union, which endeavors to market all the crops raised by the members, and of the organizations for the production and sale of cotton.

Settlement data, Salt River project.

Item.	1912	1913	1914
1. Total number of farms on project	2,954	2,680	3,000
2. Population of (1)	18,250	20,000	22,000
3. Number of irrigated farms	2,954	2,680	3,000
4. Operated by owners or managers	1,999	1,945	2,000
5. Operated by tenants	955	735	1,000
6. Population of (3)	18,250	20,000	22,000
7. Number of towns	11	11	11
8. Population of (7)	25,000	26,600	30,500
9. Total population in towns and on farms (sum of (2) and (8))	43,250	46,600	52,500
10. Number of public schools	50	52	60
11. Number of churches	44	48	50
12. Number of banks	9	11	11
13. Total capital stock	$681,000	$925,100	$798,500
14. Total amount of deposits	$6,716,292	$7,986,234	$8,353,519

PRINCIPAL CROPS.

There has been a great increase in the acreage planted to intensive crops, such as cotton, sugar cane, melons, etc. The acreage planted to alfalfa has also increased, although not to any great extent. This is due principally to the low prices of alfalfa and the relatively higher prices for intensive crops. During the season 1912–13 approximately 4,500 acres of cotton yielded a gross return of about $340,000. This season there are about 12,500 acres planted to cotton, and at this time it is in better condition than was last year's crop. If this crop is brought to maturity, as indicated by the conditions at the present time, the total crop will be worth nearly $1,000,000. There are approximately 1,500 acres in cantaloupes and melons this year as against 980 acres last year. The total production will not be as large this year as was last season's, but the quality is better and higher prices are being obtained. Approximately 4,000 acres are planted to sugar cane this year as against 500 last season. The cane looks well and promises good production, but it is impossible to state at this time what the yield will be. Fruits and vegetables promise a large return. Oranges, especially, look well and a heavy yield is expected.

Crop report, Salt River project, for year ended Sept. 30, 1913.[1]

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa hay	84,764	Ton	339,056	4	$7.00	$2,373,392	$28.00
Alfalfa-grain hay	2,166	Ton	4,332	2	9.00	38,988	18.00
Barley	24,946	Bushel	748,372	30	.65	486,442	19.50
Beans	1,623	Bushel	25,976	16	2.40	62,342	38.40
Beets	1,523	Ton	12,945	8.5	5.00	64,727	42.50
Cotton	4,545	Pound	1,704,185	375	.20	340,837	75.00
Corn	1,889	Bushel	37,770	20	.85	32,104	17.00
Cantaloupes	981	Pound	3,676,875	3,750	.016	58,830	60.00
Fruit, citrus	707	Pound	2,119,500	3,000	.04	84,780	120.00
Fruit, deciduous	1,436	Pound	6,463,125	4,500	.02	129,263	90.00
Garden	1,169	Acre			85.00	99,365	85.00
Milo maize	20,843	Ton	15,632	.75	16.00	250,116	12.00
Oats	2,399	Bushel	83,982	35	.55	46,190	19.25
Olives	133	Pound	400,500	3,000	.025	10,013	75.00
Pasture	11,638					139,659	12.00
Potatoes	478	Bushel	19,120	40	.90	17,208	36.00
Shallu	249	Ton	187	.75	16.00	2,988	12.00
Sorghum	1,480	Ton	1,110	.75	16.00	17,760	12.00
Sugar cane	487	Ton	7,312	15	5.00	36,563	75.00
Wheat	9,493	Bushel	265,790	28	.80	212,632	22.40
Watermelons	350	Ton	3,500	10	10.00	35,000	100.00
Vineyard	152	Pound	456,000	3,000	.03	13,680	90.00
Less duplicated areas	11,809						
Total	161,642					4,552,879	28.17
Irrigated, no crop:							
Peas (fertilizer)	364						
Yards	1,016						
Young fruit	290						
Total	1,670						
Total irrigated	163,312						

[1] Limited to areas irrigated from system operated by Reclamation Service, elimitating areas under private canals of Salt River Valley included in reports for former years.

Crop report, Salt River project, for year ended Sept. 30, 1913—Continued.

Areas.	Acres.	Number of farms.
Irrigable area farms reported	185,602	2,680
Irrigated area farms reported	163,312	2,680
Under rental contracts	163,312	2,680
Cropped area farms reported	161,642	2,680

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Salt River project, to June 30, 1914.

ASSETS.

Accounts receivable:			
Uncollected water rentals		$9,082.87	
Uncollected miscellaneous rentals		31,321.62	
Uncollected miscellaneous items		19,607.14	
Total			$60,011.63
Inventories:			
Animals		$9,993.00	
Mechanical and other equipment		63,849.61	
Material and supplies on hand in storehouses		134,666.62	
Unadjusted transfers between projects		2,632.36	
Undistributed cost (freight and handling on inventory property)		5,174.57	
Total			216,316.16
Construction work in process:			
Gross expenditures for construction of project to date		$11,857,804.36	
Less revenue earned during construction, as follows:			
Rentals of cottages	$8,489.37		
Rentals of grazing lands	18,806.14		
Rentals of power and light	405,660.95		
Rentals of irrigation water	1,145,975.35		
Miscellaneous revenues	9,886.14		
Profits on mess houses	17,545.32		
Profits on mercantile stores	2,609.37		
Loss on hospitals	[1] 466.32		
Contractors' freight refunds	9,131.52		
Forfeitures by default—bidders and contractors	3,980.00		
Adjustments:			
Depreciation on plant and equipment	138,508.32		
Profits shown on Government animals	25,856.05		
Rentals—water for power purposes	38,642.82		
Total deductions		1,824,625.03	
Net expenditures for construction of project to date			10,033,179.33
Total assets			10,309,507.12

[1] Deduct.

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$25,677.35	
Unpaid purchases	9,916.40	
Unpaid contract estimates	7,620.00	
Unpaid contract holdbacks	2,540.00	
Unpaid freight and express charges	10,672.57	
Unpaid passenger fares	364.16	
Unpaid agreements to purchase real estate	2,626.20	
Unpaid miscellaneous	1,148.71	
Total		$60,565.39
Reserves for repayment to reclamation fund of cost of project:		
Construction charges accrued on contracts with water-right applicants	$100,000.00	
Construction charges paid in advance by water-right applicants	52,269.00	
Total		152,269.00
Net investment:		
Disbursements	$12,035,032.49	
Transfers received from other projects	366,299.31	
	$12,401,331.80	
Less—		
Collections	2,248,650.55	
Transfers issued to other projects	56,008.52	
	2,304,659.07	
Total		10,096,672.73
Total liabilities, reserves, and capital investment of the Government		10,309,507.12

Functional feature costs of Salt River project to June 30, 1914.

Development (storage) works	$3,965,414.61
Carriage system	1,844,582.85
Distribution system	807,674.44
Drainage and flood-protection system	1,323.35
Power system	2,738,578.58
Real estate	35,643.90
Telephone lines	69,139.59
Farm-unit subdivisions	18,238.82
Roads and bridges	620,942.14
Miscellaneous preliminary investigations	185,596.98
Operation and maintenance during construction	1,565,993.34
Cost-ledger inventories	4,675.76
Gross expenditure for construction of project to date	11,857,804.36

Estimated cost of contemplated work, Salt River project, during fiscal year 1915.

Development (storage) works:		
Sluicing tunnel	$35,000	
McQueen wells	19,800	
11 new pumping plants	206,250	
		$261,050
Carriage system:		
Arizona Canal	77,944	
Eastern canal	7,300	
E. branch, consolidated	65,000	
Structures, consolidated	8,800	
By-pass, consolidated	5,000	
Division gates, consolidated	15,000	
South Canal	10,000	
Sluice gates, South Canal	15,000	
		204,044

Distribution system:		
Old laterals, north side	$44,559	
Old laterals, south side	19,097	
Wallace feeder	37,412	
Eureka feeder	1,615	
Battery connections	22,030	
Zanjero stations, etc	6,100	
		$130,813
Drainage and flood protection:		
Engineering and investigations		5,000
Power system:		
Final unit Roosevelt power house	$83,000	
Installation account Chandler contract	5,000	
Transmission line for 11 new pumping plants	56,100	
		144,100
Farm unit subdivisions:		
Engineering and surveys		7,000
Operation and maintenance during construction:		
Power division	$135,000	
Canals, etc	375,000	
		510,000
Total		1,262,007

ARIZONA-CALIFORNIA, COLORADO RIVER PROJECTS.

IRRIGATION PLAN.

The Colorado River projects consist of a number of possible irrigable developments on the lower Colorado River in Arizona and California, the principal of which are the Blythe-Parker and Needles projects. The irrigation plan of these projects provides in general for the diversion of water from Colorado River for irrigation of lands near the river, the diversion for the Blythe-Parker project being made at Headgate Rock, near Parker, Ariz., about 120 miles above Yuma, and the diversion for the Needles project being made a few miles north of Mohave City, Ariz., and about 200 miles above Yuma. The normal low-water supply of Colorado River is insufficient for present satisfactory irrigation of these projects, and their success therefore will depend on the storage of water in the drainage areas of the Grand and Green River systems, forming the Colorado River.

INVESTIGATIONS.

In 1903 topographic surveys were made of the lands along the Colorado River from the Mexican border to about 100 miles north of Needles. Beginning in 1904 and continuing intermittently to the present time, preliminary examinations and surveys of reservoir sites on the Grand and Green River systems have been made as follows: The Kremmling, Windy Gap, and Lehman, on the Grand River; the Grand Lake, at the head of the North Fork of Grand River; the Flaming Gorge, Island Park, and Browns Park, on Green River; and two sites on Yampa River, a tributary of Green River. Diamond-drill and wash borings at the proposed dam site for Browns Park Reservoir were begun in the summer of 1907 and continued through the seasons of 1908 and 1909.

No investigations have been made during the fiscal year ending June 30, 1914.

FINANCIAL STATEMENTS.

The assets and liabilities are shown in the financial statement for the secondary projects. The costs are given in the functional feature cost report which follows the above statement, and the net investment is given in Tables 11 and 12 in the appendix.

ARIZONA-CALIFORNIA, YUMA PROJECT.

F. L. Sellew, project manager, Yuma, Ariz.; A. N. Kelly, irrigation manager.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Yuma, Ariz.; Imperial, Cal.

Townships: 3 to 13 S., Rs. 21 to 25 W., Gila and Salt River meridian; 9 to 17 S., Rs. 16 to 23 E., San Bernardino meridian.

Railroad: Southern Pacific.

Railroad stations and estimated population January 1, 1914: Yuma, Ariz., 4,500; Potholes, Cal., 25.

WATER SUPPLY.

Source of water supply: Colorado River.

Area of drainage basin: 229,000 square miles above Laguna Dam.

Annual run-off in acre-feet of Colorado River at Yuma (287,000 square miles), 1902 to 1913: Maximum, 26,000,000; minimum, 7,960,000; mean, 16,300,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: 58,000 acres.

Area under water-right applications and rental contracts, season of 1914: 30,050 acres.

Length of irrigating season: 365 days.

Elevation of irrigable area: 100 to 300 feet above sea level.

Average annual rainfall on irrigable area: Five years, 3.90 inches; 15 years, 2.5 inches; 1913, 1.04 inches, relatively dry year.

Range of temperature on irrigable area: 22° to 118° F.

Character of soil of irrigable area: Bottom lands, rich alluvium; mesa lands, fresno gravelly sand.

Principal projects: Semitropical fruits, alfalfa, grain, and cotton.

Principal markets: Los Angeles and San Francisco, Cal.; Arizona towns; and eastern markets for early produce.

LANDS OPENED FOR IRRIGATION.

Date of public notices: January 12, 1910; March 8, 1912; March 6, 1913; June 23, 1913.

Location of lands opened: Tps. 15 and 16 S., R. 23 E., San Bernardino meridian.

Present status of irrigable lands opened: 6,200 acres entered, subject to the reclamation act and the act of April 21, 1904.

Limit of area of farm units: Public, 40 acres.

Duty of water: 4½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $55 and $66.

Annual operation and maintenance charge: $1 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary survey begun in 1902.

Construction recommended by board of engineers April 8, 1904.

Construction authorized by Secretary May 10, 1904.

First irrigation by Reclamation Service season of 1907.

Laguna Dam completed March, 1909.

Colorado River siphon completed June 29, 1912.

Yuma Valley Railroad constructed June, 1914.

Entire project 69.2 per cent completed June 30, 1914 (in accordance with budget as revised in August, 1913).

IRRIGATION PLAN.

The irrigation plan of the Yuma project provides for the diversion of water from the Colorado River at the Laguna Dam, 10 miles northeast of Yuma, Ariz., into two canal systems—one heading on the California side, conveying water to the irrigable lands on that side of the river, including those in the Yuma Indian Reservation, crossing the river at Yuma through an inverted siphon and serving lands in the Colorado Valley below Yuma, and the other heading on the Arizona side of the stream and watering lands in the Colorado and Gila Valleys lying east of the Colorado and north of the Gila. The plan also provides for a large pumping plant about 2½ miles below Yuma on the east main canal for raising water to irrigate 70,000 acres of mesa land, and for a small pumping plant at the terminus of the gravity canal on the Arizona side of the river below Laguna Dam for raising the water through a small lift to irrigate about 6,000 acres. The lands adjacent to the Gila and Colorado Rivers are protected from overflow of these streams by means of levees. The United States claims all waste, seepage, unappropriated spring and percolating water arising within the project and proposes to use such water in connection therewith. The Laguna Dam, 271.7 miles of canals and laterals, 15.5 miles of drainage ditches, the Colorado River siphon, 930 feet in length and 14 feet in diameter, and about 70 per cent of the levee system are completed.

CONSTRUCTION DURING FISCAL YEAR.

Laguna Dam.—Quarries were opened at each end of this structure to furnish rock for river-front protection. A small amount of work was done in training the river toward the sluice way above the dam on the California side.

Canals.—About one-eighth of a mile of canal was built on the Yuma Indian Reservation. Other construction comprised 2 small concrete checks, also 6 timber checks, 25 turnouts, and 1 culvert. In the Yuma Valley an extension of 8 miles was made to the West Main Canal, increasing the area to which we are able to supply water by about 8,000 acres. Sixteen miles of smaller canals were also built. The East Main Canal below the Somerton turnout was enlarged and extended to the Mexican boundary line, a distance of 14¾ miles. This extension will be used as a wasteway. The total excavation accomplished was as follows: West Main Canal, 350,535 cubic yards; small canals under contract, 126,821 cubic yards; small canals by Government forces, 64,413 cubic yards; East Main Canal, 405,100 cubic yards; total, 986,869 cubic yards. In addition the following wooden structures were built: Twelve bridges, 24 checks, 101 turnouts, 18 culverts, and 2 flumes; and the following concrete structures: Four combination checks and bridges, 1 check, and 1 drainage culvert.

Levees.—The only levee work accomplished was in connection with river-front protection, described under that head.

River-front protection.—Yuma Indian Reservation: Along this portion of the levee system, which also includes the protection of the sluice way immediately below Laguna Dam, there were placed, from January to June, 1914, 75,303 cubic yards from the Potholes quarry and 17,953 cubic yards from the Yuma quarries. In addition, 4,400 feet of track were laid in the yards and quarry at Laguna Dam.

Arizona side, above Yuma: The work of river-front protection at this point consisted of establishing a camp at Laguna Dam and opening a quarry there; also of laying track along the levee for 6 or 7 miles below the dam and the construction of 3 spur dikes, one a mile below, another 2 miles below, and the third 5 miles below the

dam. These dikes were first thrown up with Fresno scrapers and afterwards faced with rock to protect them from erosive currents. In the 3 dikes there was a total of 36,500 cubic yards of earth excavation. There were also placed from the quarries at Laguna Dam about 40,000 yards of rock excavation.

Arizona side, below Yuma: The river-front work on this feature consisted of the construction of a railroad along the levee top from Yuma to a point about 19 miles below, the dumping of rock at points where the levee was attacked, and the construction, between the 12 and 14 mile posts, where the levee had been cut out in previous years, of numerous temporary levees to protect the valley from overflow at this point. Nineteen and three-tenths miles of track, spurs, and sidings were built in Yuma Valley, and 72,000 cubic yards of earth excavation were handled in grading. Three and a half miles of emergency levees were built near the 12-mile break, involving a yardage of about 24,000. In addition about 1½ miles of new levee were built across Big Bend, where it is proposed to modify the course of the stream. In this work 21,200 cubic yards of earth excavation were handled. A quarry was opened in the town of Yuma and connected with the Yuma Valley Railroad, being used in connection with some of the tracks of the Southern Pacific Railroad. This quarry furnished about 18,000 cubic yards of rock during the fiscal year, which was placed on the levees below Yuma; and also some 17,900 yards for the levees above Yuma, already referred to. The total excavation for railroad, grading, emergency levees, and the Big Bend levee was 117,000 cubic yards. In addition, one trestle 165 feet long was built across the main canal and one trestle 30 feet long over the waste way from the west main canal, both trestles being on the line of the Yuma Valley Railroad.

DRAINAGE.

Yuma Indian Reservation.—During the year, about 1 mile of open drainage channel and approximately 21,000 feet of closed drain were constructed. The total excavation on open channel was 38,338 cubic yards and on the closed drains 82,246 cubic yards of excavation with the same amount of back fill. The pipe used in tile drains ranged in sizes from 15 to 20 inches, and they were placed at depths ranging roughly from 6 to 8 feet. These drains were located about 600 feet back from the levees bordering the Colorado River, and were designed to intercept the percolation from the river under the levees during the high-water stage, where the water in the river is above the surface of the irrigated lands.

The result of these drainage works was to carry away a large part of the ground waters which entered the reservation. The number and capacity of the drains were not sufficient, however, to entirely prevent seepage on the reservation during the flood stages of the river of 1914, when about 1,200 acres of the reservation became seriously damaged. The effect of the drains in partially protecting the lands was shown by the fact that in 1912, before drainage works were constructed, a similar though smaller flood and of shorter duration affected approximately 3,000 acres of lands adjacent to the levees.

The large amount of water which entered the reservation through percolation from the river during 1914, indicates that in order to pro-

tect the lands drains of much larger capacity and possibly at more frequent intervals than those heretofore built will have to be constructed. Plans for works of this nature are now under consideration.

OPERATION AND MAINTENANCE.

The irrigable area of the project is divided into 4 units—the Yuma Indian Reservation, comprising some 15,000 acres, 6,503 acres of which were opened to white settlement in 1910, the balance being divided into 10-acre units for the Indians; the Gila Valley, comprising some 18,000 acres, 8,000 of which are north of the Gila River; the Yuma Valley, comprising about 55,000 acres; and the mesa lands, comprising 70,000 acres.

There are now constructed 70½ miles of canals on the Indian reservation, 18 miles in the North Gila Valley, 154½ miles in the Yuma Valley, and 13½ miles of main canal from the dam to the siphon on the California side of the river. There are also in operation on the Indian reservation 15.2 miles of drainage canal. The areas on the mesa and in the South Gila Valley are not yet receiving water.

Water is run for irrigation during the entire year on a 7-day rotation system. In addition to the necessary work of operating and maintaining the canal system extensive rock protection of the levees was made necessary by the June flood. The maximum discharge of the river during the season's flood was 136,000 second-feet, and the long duration of the high water against the reservation levee brought about seepage conditions on some of the units. Owing, however, to the operation of the drainage canals in this district, conditions are much more favorable than they were in 1912, and an extension of the system will no doubt entirely relieve most of the units.

Including all costs of operation and maintenance, except river-front protection, $305.75 per mile of canal was expended during 1913.

Historical review, Yuma project.

Item.	1909	1910	1911	1912	1913	1914 to June 30.
Acreage for which service was prepared to supply water	7,000	16,000	16,000	16,000	50,000	58,000
Acreage irrigated	7,000	10,000	10,000	13,767	19,607	22,000
Number of farms irrigated	289	440	447	470	616	650
Miles canal operated	157	157	157	162.5	227.5	271.7
Water diverted (acre-feet)	48,943	42,018	71,563	96,409	127,307	69,361
Water delivered to land	34,019	31,057	54,346	63,273	85,411	44,086
Acre-feet per acre to area under cultivation	4.85	3.10	5.43	4.6	4.36	2

SETTLEMENT.

While lands are not coming under cultivation as rapidly as anticipated and the arrival of new settlers is slow, such growth as there is seems to be of a permanent character, and the general outlook for more rapid development is good. Two or three organizations for producing and marketing produce, cotton, alfalfa seed, etc., have been able to maintain a membership, but the cooperative tendencies are not all that could be desired. Improvement of the roads in the Yuma Valley, for which bonds have been voted, will do much toward

the more rapid settlement and cultivation of this area. The railroad down the Yuma Valley levee, which is now under construction by the service, while primarily for protection of the levee against floods, will undoubtedly be used for commercial purposes, and should be a great factor in the settlement and development of the lower portion of the Yuma Valley.

Settlement data, Yuma project.

Item.	1912	1913	To June 30, 1914.
Total number of farms on project (when completed)	4,000	4,000	4,000
Population of farms irrigated	1,490	1,663	1,755
Number of irrigated farms	470	616	650
Operated by owners	.....	496	.....
Operated by tenants	.....	120	.....
Number of towns	3	3	3
Population of towns	3,150	4,075	4,575
Total population of towns and farms	4,640	5,738	6,330
Number of public schools	13	14	14
Number of churches	6	7	7
Number of banks	3	3	3
Total capital stock	.....	.....	$160,000
Total amount of deposits	.....	.....	$732,442
Total number of depositors	.....	.....	2,346
Number of relinquishments	.....	0	1
Number of cancellations	.....	2	0

PRINCIPAL CROPS.

From the canals already constructed, it would be possible for the service to irrigate approximately 60,000 acres of land. During the year 1913, 19,607 acres were under cultivation, and this area on June 30, 1914, had been increased approximately 2,500 acres. Probably 75 per cent of the cultivated area is planted to alfalfa, the returns from this crop during 1913 being $287,000. The principal crops raised are alfalfa, alfalfa seed, barley, wheat, corn, maize, cotton, truck, and small fruits. The canvass taken December 31, 1913, shows a gross return, from all crops, of $610,000, an increase over 1912 of about 6,000 acres and $115,000.

The 6,000 acres brought under during the year will, of course, not show favorable returns until they have been cropped for at least one season. The returns per acre for 1913 approximated $36.50, and for 1912, $45. The value of live stock and farm equipment at the end of 1913 was $755,000, being an increase over 1912 of about $300,000. A general movement toward feeding the farm products to stock shows a noticeable advance, 6,000 feeders being fattened on the project during 1913, while during 1912 practically all the products were sold off the farm, hay being shipped to outside markets. Since the first of the present year approximately 3,000 acres are reported planted to cotton; last year but 60 acres were planted to this crop.

With a year-around growing season, a wonderfully productive soil, and a never-failing water supply, there is no reason to doubt that the settlement and cultivation of new lands, while slow, will continue to show a steady and stable increase until the entire area of the project will be cultivated. The year 1914 should show about the same increase over 1913 as that year did over 1912.

Crop report, Yuma project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa hay	10,321	Ton	38,100	3.69	$7.53	$287,195	$27.83
Alfalfa straw and winter pasture	10,321					30,963	3.00
Alfalfa seed	3,388	Pound	1,139,100	336.00	.111	126,450	37.33
Barley	1,201	B shel.	37,370	31.00	.628	23,475	19.55
Beans	54	do	395	7.3	2.00	790	14.63
Indian corn	289	do	3,752	13.00	.735	2,759	9.55
Milo maize	2,928	do	112,597	38.5	.513	57,740	19.72
Cane and corn fodder	598	Ton	1,709	2.86	3.733	6,380	10.66
Truck	264					22,000	83.34
Fruit	47					5,623	119.62
Cotton	62	Pound	19,610	316.00	.210	4,123	66.50
Hay (except above)	985	Ton	1,485	1.5	8.96	13,309	13.52
Pasture	1,007					22,765	22.61
Wheat	384	Bushel	7,705	20.1	.864	6,656	17.32
Less duplicated areas	15,123						
Total	16,726					610,228	36.48
Irrigated, no crop:							
Dry ground and nonbearing orchards (total)	2,881						
Total irrigated	19,607						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	32,732	616
Total irrigated area farms reported	19,607	616
Under water-right applications	4,096	174
Under rental contracts and other agreements	15,511	442
Total cropped area farms reported	16,726	

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Yuma project, to June 30, 1914.

ASSETS.

Cash in other employees' hands awaiting transfer to fiscal agent		$118.85
Accounts receivable:		
Uncollected freight refunds	$0.25	
Uncollected water rentals	4,867.95	
Uncollected miscellaneous items	78.38	
Construction charges due and uncollected from water-right applicants	127,479.42	
Operation and maintenance charges due and uncollected from water-right applicants	18,359.32	
Total		150,785.32
Inventories:		
Mercantile-store stock on hand	$352.62	
Animals	12,368.00	
Mechanical and other equipment	178,604.47	
Material and supplies on hand in storehouses	94,376.52	
Unadjusted transfers between projects	2,363.36	
Undistributed cost, freight and handling	11,040.85	
Total		299,105.82

Construction work in process:			
Gross expenditures for construction of project to date			$7,054,947.81
Less revenues earned during construction as follows:			
Rental of irrigating water	$207,136.65		
Miscellaneous revenues	2,439.25		
Profits on mess houses	3,444.43		
Profits on mercantile stores	60,730.18		
Contractor's freight refunds	18,506.11		
Adjustments:			
Depreciation on plant and equipment	12,372.75		
Profits shown on Government animals	46,563.60		
Total deductions		351,192.97	
Net expenditures for construction of project to date			$6,703,754.84
Deferred operation and maintenance charges			133,363.24
Total assets			7,287,128.07

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$30,454.83	
Unpaid purchases		88,854.50	
Unpaid freight and express		66,846.85	
Unpaid passenger fares		246.37	
Unpaid right of way agreements		2,689.90	
Unredeemed coupon books		585.50	
Unredeemed meal tickets		2,077.25	
Unpaid miscellaneous		795.00	
Total			$192,550.20
Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contract with water-right applicants		$269,530.18	
Construction charges paid in advance by water-right applicants		617.50	
Construction charges paid and forfeited by water-right applicants		754.00	
Total			270,901.68
Net investment:			
Disbursements	$7,232,382.73		
Transfers received	194,137.91		
Total		7,426,520.64	
Less—			
Collections	$515,195.65		
Transfers issued	87,648.80		
		602,844.45	
Total			6,823,676.19
Total liabilities, reserves, and capital investment of the Government			7,287,128.07

Functional feature costs of Yuma project to June 30, 1914.

Development (storage) works	$2,024,655.16
Carriage system	580,092.29
Distribution system	1,936,234.82

Drainage and flood-protection system	$1,600,909.80
Real estate	136,327.33
Telephone lines	8,414.31
Farm unit subdivision	22,019.68
Miscellaneous preliminary investigation	332,841.54
Operation and maintenance during construction	412,853.74
Cost ledger inventories	599.14
Gross expenditures for construction of project to date	7,054,947.81

Operating revenues and expenses, Yuma project, to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$2,634.80
Maintenance	38,778.87
Distribution system:	
Operation	22,258.85
Maintenance	39,529.08
Drainage and flood-protection system:	
Operation	4,001.27
Maintenance	636.34
Supplemental construction	89,546.42
Total	197,385.63

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	62,445.70
Operation and maintenance charges paid in advance by water-right applicants	8.17
Operation and maintenance charges paid and forfeited by water-right applicants	251.00
Rental of land and buildings	1,317.52
Deferred operation and maintenance revenues	133,363.24
Total	197,385.63

Estimated cost of contemplated work, Yuma project, during fiscal year 1915.

Development (storage) works:		
Arizona levee	$84,000.00	
Modification of gates at Laguna Dam	36,000.00	
		$120,000.00
Carriage system:		
Yuma main canal	9,000.00	
Siphon	2,000.00	
		11,000.00
Distribution system:		
Completion of Yuma Valley distribution system	247,000.00	
Completion of reservation distribution system	128,000.00	
Completion of North Gila Valley distribution system	56,000.00	
		431,000.00
Drainage and flood-protection system:		
River-front protection	462,500.00	
Drainage	255,000.00	
Miscellaneous construction	1,970.92	
		719,470.92
Real estate		15,000.00
Farm unit subdivisions: Surveys		14,000.00
Operation and maintenance during construction		73,929.11
Operation and maintenance under public notice		31,645.49
Total		1,416,045.52

CALIFORNIA, IRON CANYON COOPERATIVE WORK.

JOHN T. WHISTLER, engineer, Portland, Oreg.

Under date of October 6, 1913, an agreement was entered into between the United States and the Iron Canyon Project Association for further surveys, investigations, and studies of the Iron Canyon project. The sum of $10,000 had been subscribed by various individuals and organizations through the Iron Canyon Project Association, and an equal sum was alloted by the Secretary of the Interior, making $20,000 available for these investigations. Work was started immediately by a diamond drill party with two drills, making borings at the several alternative sites in Iron Canyon, about 7 miles above Red Bluff.

Preliminary studies had previously been made for storage at this site, but no borings had been made. The height of dam previously proposed was approximately 100 feet, with a very limited storage above the diversion elevation proposed.

For the present investigations detailed surveys on a scale of 1,000 feet to the inch were made of the reservoir site showing and classifying all properties within the site. Between the diversion elevation previously considered and a flow line some 50 feet higher a storage capacity was found of over 600,000 acre-feet. This reservoir site lies in townships 28, 29, 30, and 31 north, ranges 2, 3, and 4 west, Mount Diablo meridian. The problems developed, requiring consideration in the studies, were the irrigation of something over 200,000 acres of land below Red Bluff, the development of 75,000 to 80,000 electric horsepower, the reduction of Sacramento River flood peaks at Red Bluff from over 250,000 cubic feet per second to 100,000 cubic feet per second, and the material increase of river discharge as affecting navigation interests.

Studies have been made, and material is being prepared for a report on this project.

FINANCIAL STATEMENTS.

The assets and liabilities are shown in the financial statement for the secondary projects. The costs are given in the functional feature cost report, which follows the above statement and the net investment is given in Tables 11 and 12 in the appendix.

CALIFORNIA, ORLAND PROJECT.

A. N. BURCH, project manager, Orland, Cal.

(For *Results to June 30, 1914*, and *Data for Complete Projects* see appendix.)

LOCATION.

Counties: Glenn and Tehama; reservoir and storage feed canal in Colusa County.

Townships: 21 to 23 N., Rs. 2 to 4 W., Mount Diablo meridian.

Railroads and other transportation lines: Southern Pacific Railroad and steamers on Sacramento River.

Railroad station and estimated population January 1, 1914: Orland, 1,350; railroad flag stations with freight sidetracks, Greenwood, Wyo. and Malton.

WATER SUPPLY.

Source of water supply: Stony Creek.

Area of drainage basin: Above project diversion dams, 735 square miles; above feed canal diversion dam, 97 square miles; above East Park Dam (Little Stony), 102 square miles.

Annual run-off in acre-feet: Stony Creek, near Fruto (601 square miles), 1907 to 1913, maximum, 940,000; minimum, 135,200; mean, 500,000. Little Stony Creek, at East Park Dam (102 square miles), 1907 to 1913, maximum, 170,800; minimum, 12,600; mean, 71,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: 14,300 acres.

Area under rental contracts, season of 1914: 8,000 acres.

Length of irrigating season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 250 feet above sea level.

Average annual rainfall on irrigable area: 1883 to 1914, 17 inches; 1913–14, 28.30 inches (excessive).

Range of temperature on irrigable area: 26° to 114° F.

Character of soil of irrigable area: Sandy and gravelly loam, silt loam.

Principal products: Alfalfa, citrus and other fruits, and vegetables.

Principal markets: San Francisco, Cal.; Portland, Oreg.; eastern markets.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands are being irrigated under rental contracts.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys made in 1906.

Construction recommended by board of engineers November 12, 1906.

Construction authorized by Secretary October 5, 1907.

First irrigation by Reclamation Service, season of 1910.

East Park Dam completed July, 1910.

Construction of East Park feed canal and second unit of the project authorized by Secretary July 25, 1913.

Entire project 70 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Orland project provides for the storage of water in a reservoir controlled by East Park Dam on Little Stony Creek, about 40 miles southwest of Orland, Cal., and a feed canal 6½ miles long connecting the storage basin with Stony Creek. The diversion works for the feed canal are located about 3½ miles west of Stonyford. For the irrigation of lands in the vicinity of Orland water is diverted from Stony Creek into the canal systems at two points, namely, Miller Buttes, 9½ miles northwest of Orland, for the South Canal system, and at the north side weir, 5 miles northwest of Orland, for the North Side Canal system. The South Canal system is to irrigate 13,000 acres on the south side and the North Canal system 7,000 acres on the north side of Stony Creek. The stored water is conveyed from East Park in the natural creek channel 41 miles to the Miller Buttes diversion and 45 miles to the north side weir, where it is taken out in distribution systems comprising 135 miles of canals and laterals. The plan also includes a high line canal from which power may be developed for pumping. The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating water arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law heretofore made for the purposes of the project.

Work now under way includes bulding a feed canal 6½ miles in length from Stony Creek to East Park Reservoir, involving 220,000 cubic yards of excavation and 4,000 cubic yards of concrete in structures, raising East Park spillway, enlarging a portion of the South Canal, and building 35 miles of laterals with their control structures.

The present limits of the Orland project may be considered as a unit of the Sacramento Valley project. It may be extended by constructing additional reservoirs on Stony Creek and its tributaries. The chief additional reservoir sites available are Millsite, on Stony Creek, near Fruto; Briscoe, on Briscoe Creek, near Elk Creek; Stonyford, on Stony Creek, at Stonyford; and Stony Gorge, on Stony Creek, near Elk Creek.

CONSTRUCTION DURING FISCAL YEAR.

The following construction work was done during the year:

Structures built, fiscal year 1914.

Canal lining	square yards	7,185
Farm and lateral turnouts		20
Checks and drops		8
Timber deck and pipe bridges		7
Culverts		15

Product of pipe yard, fiscal year 1914.

12-inch	linear feet	688
18-inch	do	450
24-inch	do	814

Excavation, fiscal year 1914.

East Park feed canal, all classes	cubic yards	93,001
Distribution system	do	11,020
Total		104,021

OPERATION AND MAINTENANCE.

The irrigation works operated in 1913 included the East Park Reservoir and the North and South Canal headworks, together with 23 miles of canals with capacities of 50 to 150 second-feet and 68

miles of laterals with capacities of 10 to 45 second-feet. The distribution system operated contains 1,125 structures.

Historical review, Orland project.

Item.	1910	1911	1912	1913	1914 (estimated).
Acreage for which service was prepared to supply water	2,000	14,000	14,200	14,300	14,300
Acreage irrigated	700	2,663	4,230	6,617	8,000
Miles of canal operated	22	64	88	91	95
Water stored (acre-feet)	.....	47,000	25,000	14,800	45,600
Water diverted (acre-feet)	4,800	39,200	34,000	40,500	42,000
Water delivered to land (acre-feet)	2,400	10,335	16,702	19,850	24,000
Per acre of land irrigated (acre-feet)	3.4	3.9	3.97	3.00	3.50

SETTLEMENT.

The farmers appear to be in a fairly prosperous condition, as evidenced by the extent of the investment and the quality of farm buildings and other improvements made during the past year. There are no strictly cooperative organizations on the project for the handling of farm business. The creamery, which handles all of the butter product, is a stock concern which was financed principally by the dairy interests. The almond growers are affiliated with the State organization, through which their crop is marketed. A great many dairy cows have been brought in by the creamery company, banks, and others interested in the development of the industry and placed with the farmers on easy terms of payment. There has been very moderate activity in the disposal of unimproved lands and not a great deal of developed land has changed hands. As to the permanency of the population, to the best of my knowledge, there has been but one instance during the year of a farmer disposing of his place and leaving the project.

Settlement data, Orland project.

Item.	1912	1913	1914
Total number of farms on the project [1]	350	350	507
Population	700	950	1,100
Number of irrigated farms	211	246	275
Operated by owners	193	226	253
Operated by tenants	18	20	22
Population	645	896	1,000
Number of towns	1	1	1
Population	1,200	1,300	1,350
Total population	1,900	2,250	2,450
Number of public schools	5	6	8
Number of churches	4	5	5
Number of banks	1	2	2
Total capital stock	$55,000	$110,000	$110,000
Total amount of deposits	.....	.....	$391,000
Total number of depositors	.....	.....	1,263

[1] 40-acre units.

PRINCIPAL CROPS.

The principal money-producing crop for 1913 was alfalfa, comprising 5,084 acres, an increase of 1,461 acres over the previous year.

The yield was 15,300 tons, all but 3,600 tons of which was consumed on the project in feeding dairy and other stock. At the close of the year there were 1,384 head of dairy stock on the project, which by the end of 1914 it is estimated will be increased to 2,400 head.

The total acreage of alfalfa in 1914 will be about 6,000, with a yield of about 24,000 tons. Prior to 1914 the proportion of orchard planting to alfalfa planting has been greatly in favor of alfalfa, but for 1914 the planting of orchards will probably exceed that of alfalfa.

Crop report, Orland project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa hay	3,591	Ton	15,324	4.27	$10.01	$153,477	$42.74
Alfalfa pasture	3,455					15,037	4.35
Alfalfa, young [1]	1,493						
Berries	2	Pound	5,206	2,603	.10	521	260.00
Corn, sorghum	94	Ton	69	.73	26.78	1,848	19.55
Corn, Indian	21	Bushel	342	16.7	.96	327	15.95
Fruit, citrus	71	Box [2]	7,093	100.6	2.47	17,550	248.94
Fruit, deciduous [3]	68	Pound	140,000	2,045	.012	1,661	24.25
Fruit, small [4]	4					709	177.35
Garden	71					7,651	108.50
Nursery	5					1,628	295.91
Olives	5	Pound	19,250	3,500	.08	1,540	280.00
Prunes	20	Pound	100,000	5,000	.02	2,000	100.00
Less duplicated areas	2,913						
Total	5,987					203,949	34.07
Irrigated, no crop:							
Nonbearing orchard	493						
Miscellaneous	137						
Total	630						
Total irrigated	6,617						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	7,573	246
Total irrigated area farms reported	6,616	246
Under rental contracts	6,511	244
Under vested rights	105	2
Total cropped area farms reported	5,987	246

[1] No hay on account of water shortage.
[2] Equivalent to 70 to 75 pounds of fruit; average, 71 pounds.
[3] Peaches, pears, prunes, apricots.
[4] Berries, grapes, etc.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Orland project, to June 30, 1914.

ASSSETS.

Inventories:		
Animals	$425.00	
Mechanical and other equipment	9,572.64	
Material and supplies on hand in storehouses	4,903.58	
Total		$14,901.22

Construction work in process:			
Gross expenditures for construction of project to date		$676,634.50	
Less revenue earned during construction, as follows—			
Rentals of cottages	$744.05		
Rentals of grazing lands	2,815.00		
Rentals of irrigation water	33,887.60		
Miscellaneous revenues	1,485.61		
Profits on mess houses	14.97		
Loss on mercantile stores	[1] 6.51		
Profits on hospitals	187.75		
Contractor's freight refunds	221.35		
Forfeitures by default—bidders and contractors	1,725.00		
Adjustments—			
Depreciation on plant and equipment	176.64		
Profits shown on Government animals	19.52		
Total deductions		41,261.93	
Net expenditures for construction of project to date			$635,372.57
Total assets			650,273.79

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$1,245.61	
Unpaid purchases		596.48	
Unpaid contract estimates		11,046.24	
Unpaid contract holdbacks		2,713.29	
Unpaid freight and express charges		1,092.61	
Unpaid passenger fares		51.25	
Unpaid agreements to purchase real estate		2,107.50	
Unpaid miscellaneous		202.00	
Total			$19,054.98
Net investment:			
Disbursements	$643,272.25		
Transfers received from other projects	38,087.32		
		$681,359.57	
Less—			
Collections	45,750.61		
Transfers issued to other projects	4,390.15		
		50,140.76	
Total			631,218.81
Total liabilities, reserves, and capital investment of the Government			650,273.79

Functional feature costs of Orland project to June 30, 1914.

Development (storage) works	$353,091.74
Distribution system	246,487.86
Real estate—Headquarters buildings and grounds	14,047.50
Miscellaneous preliminary investigations	4,351.15
Operation and maintenance during construction	58,656.25
Gross expenditures for construction of project to date	676,634.50

[1] Deduct.

Estimated cost of contemplated work, Orland project, during fiscal year 1915.

Development (storage) works:		
East Park feed canal—		
Surveys	$3,084.56	
Rights of way	1,795.38	
Excavation	87,963.33	
Structures	57,355.37	
		$150,198.94
Distribution system:		
Canal system—		
Raising banks and enlarging South Canal	6,000.00	
Structures and lining	4,000.00	
Lateral system—		
Excavation	27,000.00	
Structures, lining, etc	86,000.00	
		123,000.00
Examination and investigations, miscellaneous surveys		500.00
Drainage		10,000.00
Operation and maintenance during construction		23,000.00
Total		306,698.64

COLORADO, GRAND VALLEY PROJECT.

J. H. MINER, project manager, Grand Junction, Colo.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

County: Mesa.

Townships: 1 N., Rs. 1 E. and 1 to 3 W.; 2 N., Rs. 2 and 3 W.; 1 S., Rs. 1 E. and 1 W., Ute meridian. 9 S., Rs. 101 to 104 W.; 10 S., Rs. 98, 101, and 103 W.; 11 S., Rs. 98 and 99 W., sixth principal meridian.

Railroads: Denver & Rio Grande; Colorado Midland.

Railroad stations and estimated population, January 1, 1914: Palisade, 968; Clifton, 138; Grand Junction, 8,250; Fruita, 978; Loma, 83; Mack, 40.

WATER SUPPLY.

Source of water supply: Grand River.

Area of drainage basin: 8,550 square miles above Palisade.

Annual run-off in acre-feet of Grand River at Palisade, 1897 to 1899 and 1902 to 1913: Maximum, 5,230,000 (1912); minimum, 2,300,000; mean, 3,733,800.

Discharge in second-feet of Grand River at Palisade, 1902 to 1913: Maximum, 43,400; minimum, 944.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Length of irrigation season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 4,700 feet above sea level.

Average annual rainfall on irrigable area: 21 years, 8.23 inches; 1913, 7.28 inches.

Range of temperature on irrigable area: —15° to 100° F.

Character of soil of irrigable area: Sandy loam, sandy mesas, and adobe.

Principal products: Fruit, sugar beets, alfalfa.

Principal markets: Large cities east of Rocky Mountains for fruit; other products, local.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in September, 1902.

Construction recommended by board of engineers December 15, 1908.

Purchase of rights of way authorized by Secretary November 4, 1911.

Construction authorized by Secretary September 23, 1912.

Entire project 24.3 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Grand Valley project provides for the diversion of water from the Grand River by a dam to be located about 8 miles northeast of Palisade, Colo., into a canal system on the north side of the river, for the irrigation of lands lying north and west of Grand Junction, Fruita, and Mack, Colo. About 42,750 acres will be supplied by gravity and 10,250 acres by electrically operated pumping plants to be located on the gravity canal. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith. On the first 6½ miles of the main canal, located in the canyon of the Grand River, there are 3 tunnels, respectively 3,723, 1,655, and 7,292 feet long. On June 30, 1914, the headworks were 30.8 per cent completed, the earthwork and structures on

the canal through the canyon were practically completed, Tunnel No. 1 was completed, and the excavation of Tunnels Nos. 2 and 3 was, respectively, 100 per cent and 57.5 per cent completed. Acceptable bids for the earthwork on the next 30 miles of main canal had been received. Preparations for the early construction of the laterals to supply the eastern 15,000 acres under the gravity canal were under way.

CONSTRUCTION DURING FISCAL YEAR.

Headworks.—Work on this feature has been carried on by Government forces. The excavation for the canal intake and sluiceway was begun in August, 1913, and completed in April, 1914. The excavated material consisted principally of cobblestones compactly embedded in gravel. In October the railroad siding and camp buildings were completed. The first concrete was placed January 9, 1914. Concrete work on the sluiceway was completed May 4, 1914, and on the intake, May 23, 1914. The work on the paved slopes above and below the canal intake was interrupted by high water at that time, when about 75 per cent complete. The installation of the nine 7 by 7 foot regulator gates was completed in April. A temporary pile footbridge, to be subsequently used in depositing material in the cofferdam, was completed in March. On June 3, 1914, a flood flow of 43,000 second-feet, practically equal to the maximum, passed down the Grand River without damage to the pile bridge or the completed work. The installation of a cableway, a crushing, screening, and concrete mixing plant, and a power station for use in completing the concrete work on the weir has been 90 per cent completed. The steel roller weirs to form the movable crests of the structure have been ordered from the German patentees. The cubic yards of material handled on this feature were as follows: Dry excavation, 14,335; wet excavation, 6,690; concrete, 3,955; riprap, 608.

Main canal, canyon division.—Work on the three tunnels has been performed by Government forces and on the canal excavation by contract. Tunnel No. 1 was holed through September 27, 1913, 1,578 linear feet being excavated after June 30, 1913, by two daily shifts. The material excavated was mainly a hard, blocky shale. The concreting plant was completed in October, 1913; placing of the concrete lining was begun in November, 1913, and completed in March, 1914. Nine thousand five hundred and forty-five cubic yards of concrete were used in lining the 3,723 foot tunnel, the portals, and the 492 feet of lined canal connecting the lower portal with the Jerry Creek siphon. The excavation of Tunnel No. 2 was continued from the upper portal through sandstone until the last of October, 1913, when it was discontinued at a distance of 1,000 feet in from the portal, to allow the grading contractor to finish up the waste banks. At the lower portal, the excavation of an incline through the portal cut was begun in July, and of the tunnel proper, on August 5, 1913. The tunnel was holed through December 27, 1913, and excavation fully completed January 12, 1914. During the fiscal year 650 feet were excavated in the upper heading and 655 feet in the lower. The material encountered in the latter heading consisted of alternating thin layers of shale and sandstone.

Work on the excavation of Tunnel No. 3 has been conducted from both portals and both ways from an adit 95 feet long located 3,170 feet from the upper portal. The material excavated has been largely

earth and boulders in headings Nos. 1 and 2, and a gritty shale in headings Nos. 3 and 4. (The headings are numbered consecutively beginning at the upper portal.) Work was begun on the adit October 20, 1913, and on the portal cuts soon afterwards. The excavation of headings Nos. 2, 3, and 4 was begun in December, 1913, and of heading No. 1 in January, 1914. On June 30, 1914, the advance was as follows: Heading No. 1, 971 feet; heading No. 2, 929 feet; heading No. 3, 1,169 feet; heading No. 4, 1,125 feet. Total, 4,194 feet, or 57.5 per cent of the total length.

The camp buildings and concrete plant used at Tunnel No. 1 have been razed, moved to the upper portal of Tunnel No. 3, and partially reassembled for use in lining Tunnels Nos. 2 and 3.

Work was begun July 9, 1913, on the excavation of the earthwork on the canyon division of the main canal. On June 30, 1914, the contract was 99 per cent complete. The material moved consisted of 333,063 cubic yards of earth, 21,158 cubic yards of indurated material, and 14,856 cubic yards of rock. Six hundred and thirty-one cubic yards of riprap were placed, and 1,421,003 cubic yards of material overhauled one station. Sixteen thousand eight hundred and seventy-three cubic yards of the material excavated on schedule No. 3 were loaded into standard-gauge dump cars and handled by forces of the Rio Grande Junction Railway in raising the grade of the railroad track in the vicinity of the project's diversion dam. A total of 5,800 feet of track was raised. The highest rise was 4.7 feet.

A double 4.5 by 5 foot reinforced concrete culvert was built at station 237+56.5. Three reinforced concrete siphons were built to carry the waters of Asbury, Jerry, and Coal Canyon Creeks across the canal. The culvert required 1,792 cubic yards of concrete, and the siphons averaged 2,050 cubic yards of excavation, 604 cubic yards of concrete, and 350 cubic yards of paving. Wooden trestle bridges have been built to carry the operation and maintenance road across Asbury, Jerry, and Coal Canyon Creeks and the tram tracks of the Grand Junction Mining & Fuel Co. A wooden trestle was constructed to support the Rio Grande Junction Railroad track during the excavation of the canal. The concrete supports for the permanent bridge have been completed.

Main canal, divisions 2, 3, and 4.—Final location of 30 miles of main canal from Palisade west was made in March and April, 1914. Bids for the earthwork were opened June 16, 1914. Preparations for the construction of the structures by Government forces have been well advanced. A 5 by 5 foot concrete culvert, containing 270 cubic yards of concrete, has been completed at station 356. Thirty-five carloads of vitrified pipe have been ordered for the smaller culverts and the drainage of canal banks built on steep side slopes.

SETTLEMENT.

No settlement on project land has been effected during the year, because the time of delivering water appeared too far in the future to make settlement expedient. The Grand Valley Water Users' Association has made preparations to render valuable assistance to prospective settlers when the lands are ready for settlement.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Grand Valley project, to June 30, 1914.

ASSETS.

Cash in fiscal agent's possession awaiting remittance			$86.25
Accounts receivable, uncollected miscellaneous rentals			178.00
Inventories:			
Mercantile stores, stock on hand		$211.39	
Animals		812.50	
Mechanical and other equipment		43,569.55	
Material and supplies on hand in storehouses		29,846.83	
Goods in transit		4,931.81	
Unadjusted transfers between projects		[1] 10,978.83	
Total			68,393.25
Construction work in process:			
Gross expenditures for construction of project to date		1,123,981.92	
Less revenue earned during construction—			
Rentals of cottages	$271.65		
Rentals of grazing lands	1,483.00		
Rentals of power and light	56.91		
Rentals of telephones	7.85		
Profits on mess houses	3,470.85		
Profits on mercantile stores	736.58		
Profits on hospitals	1,426.76		
Adjustments—			
Depreciation on plant and equipment	11,177.89		
Profits shown on Government animals	600.96		
Total deductions		19,232.45	
Net expenditures for construction of project to date			1,104,749.47
Total assets			1,173,406.97

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$25,576.91	
Unpaid purchases		16,189.14	
Unpaid contract estimates		4,203.53	
Unpaid contract holdbacks		11,081.54	
Unpaid freight and express charges		8,149.30	
Unpaid passenger fares		105.95	
Unpaid agreements to purchase real estate		1,765.00	
Total			67,071.37
Net investment:			
Disbursements	$1,051,251.11		
Transfers received from other projects	60,996.64		
		1,112,247.75	
Less—			
Collections	2,497.54		
Transfers issued to other projects	3,414.61		
		5,912.15	
Total			1,106,335.60
Total liabilities, reserves, and capital investment of the Government			1,173,406.97

[1] Deduct.

Functional feature costs of Grand Valley project to June 30, 1914.

Carriage system	$1,031,470.40
Telephone lines	1,443.94
Farm-unit subdivisions	1,729.43
Roads and bridges	6,305.24
Miscellaneous preliminary investigations	82,175.07
Cost-ledger inventories	857.84
Gross expenditures for construction of project to date	1,123,981.92

Estimated cost of contemplated works, Grand Valley project, during fiscal year 1915.

Carriage system:		
Headworks	$200,000.00	
Main canal, division No. 1	300,000.00	
Main canal, division No. 2	200,500.00	
Main canal, division No. 3	197,500.00	
Main canal, division No. 4	102,000.00	
		$1,000,000.00
Distribution system:		
Laterals	270,000.00	
Miscellaneous permanent buildings	10,000.00	
		280,000.00
Drainage and flood protection system:		
Preliminary investigations	3,000.00	
Protection of wasteway channels	25,000.00	
		28,000.00
Power system		7,000.00
Real estate		2,000.00
Telephone system		8,500.00
Farm-unit subdivision		1,800.00
Roads and bridges		5,000.00
Miscellaneous preliminary investigations		1,500.00
Operation and maintenance during construction		10,000.00
Total		1,343,800.00

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

F. D. PYLE, project manager, Montrose, Colo.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION AND CLIMATIC CONDITIONS.

Counties: Montrose and Delta.

Townships: 15 S., Rs. 94 to 96 W., sixth principal meridian; 48 to 51 N., Rs. 7 to 12 W., New Mexico meridian.

Railroad: Denver & Rio Grande.

Railroad stations and estimated population January 1, 1914: Montrose, 3,300; Olathe, 600; and Delta, 2,300.

WATER SUPPLY.

Sources of water supply: Gunnison and Uncompahgre Rivers.

Area of drainage basins: Gunnison River, 3,850 square miles; Uncompahgre River, 500 square miles.

Run-off in acre-feet: April to November, inclusive, Gunnison River at River Portal (3,850 square miles), 1905 to 1913: Maximum, 1,798,000; minimum, 917,000; mean, 1,431,700. Uncompahgre River at Fort Crawford (500 square miles), 1896–1899, 1903–1905, 1908–1913: Maximum, 207,000; minimum, 124,000; mean, 164,000.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands irrigated from canals operated by the Reclamation Service are furnished water under rental contracts. All unentered public lands within the project were withdrawn from all forms of entry July 27, 1908.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: Estimated at 58,000 acres.

Area under rental contracts, season of 1914: Estimated at 43,000 acres.

Area irrigated, season of 1913: 37,482 acres.

NOTE.—Of the above area 31,428 acres were irrigated from the canals operated by the service, and 6,054 acres from canals that were operated by their owners, who have contracted to turn them over to the Government, and that were supplied with Gunnison water.

Length of irrigating season: From April 1 to October 31, 214 days, on all Government canals except the Loutsenhizer, under which the season ends November 15.

Average elevation of irrigable area: 6,000 feet above sea level.

Average annual rainfall on irrigable area: 14 years, 9.07 inches; 1913, at Montrose, 8.06 inches.

Range of temperature on irrigable area: —25° to 98° F.

Character of soil of irrigable area: Red sandy gravel, adobe, and clay loam.

Principal products: Alfalfa, grain, fruits, sugar beets, potatoes, and vegetables.

Principal markets: Denver, Colo.; Chicago, Ill.; and local mining camps.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in June, 1901.

Construction recommended by director March 7, 1903.

Construction conditionally authorized by Secretary March 14, 1903.

Construction authorized by Secretary June 7, 1904.
Contract for construction of Gunnison Tunnel approved October 18, 1904.
First irrigation by Reclamation Service, season of 1908.
Gunnison Tunnel completed for present use June, 1910.
Gunnison River diversion dam completed January, 1912.
Entire project 62.4 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Uncompahgre Valley project provides for the diversion of water from the canyon of Gunnison River by means of a tunnel about 6 miles long and a canal 11 miles long to supplement the flow of Uncompahgre River, and in addition thereto the utilization of all waste, seepage, spring, percolating, and return water arising within the project in the irrigation of lands in Uncompahgre Valley. To distribute the waters of the Uncompahgre and Gunnison Rivers thus combined the plan provides for the purchase, enlargement, and extension of the more important private canals taking water from Uncompahgre River and for supplementing them by laterals diverting from the South Canal and by high-line canals, one on either side of the valley, taking water from Uncompahgre River.

The surveys for and diamond drilling investigation of the Taylor Park Reservoir have been completed, but no construction work has been undertaken. The diversion dam in the Gunnison River is complete except for the installation of steel flashboards. The Gunnison Tunnel is complete to the extent necessary for its present use; there remains about 50 per cent of the length of the tunnel to be lined with concrete. The South Canal system is now complete except for the enlargement and extension of one or two of the laterals, the replacing of the timber flume on division 18 of the main line and the construction of the concrete outlet. The Montrose and Delta main line and a portion of the lateral system have been completed; the unfinished work under this system embraces the completion of the concrete headworks and lateral system and the replacement of some of the older structures. The Loutsenhizer Canal system is complete except for the building of a feeder channel out of Cedar Creek and the replacement of older structures. The main line and a portion of the lateral system under the East Canal have been completed; the uncompleted work consists of the building of a control weir, the completion of the lateral system, and the building of the Garnet Mesa siphon.

The main line and lateral system of the West Canal are complete except for the building of the siphon headworks and miscellaneous minor structures. The main line of the Selig Canal system is complete for 50 per cent of its length; no construction work whatsoever has been accomplished on the lateral system.

CONSTRUCTION DURING FISCAL YEAR.

Taylor Park Reservoir.—At the upper dam site two holes were drilled to a depth of 45 and 103 feet, respectively. At the lower dam site five holes were driven to a depth of 37, 55.3, 38, 57, and 98.2 feet, respectively. The location surveys for the Taylor Park cut-off road, 4.56 miles in length, were completed.

Gunnison Tunnel.—Two thousand two hundred and forty-two linear feet of washed-out floor between the track from station 294+55 to station 306+00 and from station 268+05 to station 279+02 were replaced with new concrete. Sixteen bays 8 feet high by 4 feet wide by 2 feet deep were torn out of the ruptured sidewalls at station 194+00, and these openings were replaced with fresh concrete. A rock wall was laid at station 78+00 and 32 gage boxes for making coefficient determinations were placed at every 1,000-foot station in the tunnel.

South Canal system.—Under the direction of the Bureau of Standards, an 8-inch experimental tile drain 750 feet long was placed near mile post 6. Five hundred and sixty-eight linear feet of 4-inch re-

inforced concrete floor were placed on top of the old concrete floor; 644 linear feet of 4-inch reinforced concrete on top of the old concrete lining; and 22 linear feet of 4-inch reinforced concrete on top of the old concrete lining on the right side of the canal. This repair work extended at various places from station 224 to station 238, and 25 cubic yards of concrete were used in repair work on a culvert at station 275+00. The concrete reconstruction changes on division 18 of the main line were completed; the timber flume was extended 81 linear feet and joined to a 288 linear-foot section of new concrete lining, necessitating the tearing out of 188 linear feet of the old concrete section. A 600 linear-foot timber chute was built on lateral C of the Cedar Valley high line. Several tap boxes and other minor structures were also built on the lateral system.

Montrose and Delta system.—Three hundred and sixty linear feet of round piles 8 feet center to center were driven as a protection for the dike at the headworks and 72 linear feet of sheet piling were driven as a protection for the dike and also to form an abutment for the weir to be placed at a later date. Five concrete guide walls were built in the sluiceway of the headworks to facilitate the removal of gravel. Three walls were found to be ineffective and were later removed. Thirty-seven cubic yards of concrete were placed in abutment piers for a highway crossing near mile post 1, the superstructure of which will be built by and at the expense of Montrose County. The drainage trenches to prevent sliding of the main canal banks near Happy Canyon were completed. The old timber flume on the main line over Happy Canyon Creek was replaced with a No. 204 twin semicircular steel flume 252 feet long, with concrete approaches, the upper approach being 50 feet long and the lower one 40 feet. In order to prevent seepage at the ends of the High Mesa siphon it was found necessary to place 610 linear feet of No. 84 bench flume on the upper mesa and 1,350 linear feet on the lower mesa. Five hundred linear feet of No. 84 semicircular steel bench flume were built on the Poverty Mesa lateral to prevent excessive seepage. The timber work on the 22 semicircular steel flumes on the King lateral extension and the 2 on the King lateral was given two coats of paint; 4.7 miles of laterals were built on this system. Several small structures such as drops, chutes, headgates, and bridges were built on the lateral system and other minor structures replaced on the older ditches.

Loutsenhizer system.—Two timber overflows for carrying flood waters over the main canal were built and several small minor structures such as taps, etc., were replaced.

East Canal system.—A contract was entered into under date of August 30, 1913, for the excavation of 3.3 miles of the East Canal main line, embracing schedules 2 and 4 to 7, inclusive. The contractor was unable to complete the contract at the specified time on account of the severity of the winter conditions, and two extensions of time were granted to him. The work was finally completed on March 14, 1914, and involved the total excavation of 81,367 cubic yards. In addition to the foregoing contract work, Government forces excavated schedules 1 and 3 of the main line, involving the removal of 25,250 cubic yards; completed the excavation of laterals 1 and 2 and Branch "B" of lateral 2, necessitating the removal of

15,880 cubic yards; and began excavation work on laterals 4 and 5 during the latter part of the fiscal year. A timber headwork supported on round piles and having 10 gate openings, together with sheet piling canal and river protection wings, was built. Four hundred and eighty linear feet of continuous sheet piling were driven on Division 1 as a protection for the lower bank from the washing of the Uncompahgre River, and a timber wasteway was built at Station 38 in connection with the protection piling. A concrete lined channel, involving the excavation of 300 cubic yards and the placing of 200 cubic yards of concrete, was built under the Denver & Rio Grande Railroad tracks. Division 3, 3,900 feet long, was lined throughout its entire length with a timber bench flume in order to prevent excessive seepage into the town of Olathe. A temporary timber bench flume 1,000 feet long was built along the berm of the canal bank on Division 5 in order to continue temporarily the irrigation to lands formerly watered through the Colorow Ditch, but which eventually will be irrigated from the Selig Canal system. Two No. 228 semicircular steel flumes of the Colorado Culvert & Flume Co. type were installed; these flumes have a total length of 832 feet, are supported on a pile foundation, and have timber approaches at both ends. Six timber checks and 13 bridges were built along the main line, and 4 headgates, 7 bridges, 18 drops, 9 culverts, and 1 small flume were built on the lateral system. Numerous other minor structures, such as taps, etc., were also built on this system.

West Canal system.—The contractor completed the excavation of schedule 2 of the West Canal extension tunnel in July, 1913. Thirty linear feet of tunnel were driven during the fiscal year. An informal contract was entered into under date of September 24, 1913, for the excavation of the West Canal extension lateral, involving the excavation of 4,523 cubic yards. Government forces completed the excavation of the West Canal extension from station 830 to station 1004. One concrete and two timber wasteways were built along the main line at Happy Canyon Creek, Dolores Creek, and Spring Creek, respectively. The West Canal extension tunnel and its approaches were lined with concrete, 620 cubic yards being placed. On the Shavano lateral, concrete approaches were built to three semicircular steel flumes, and a reinforced concrete box culvert, 60 feet long, and a 26-inch reinforced concrete pipe siphon, 77 feet long, were also constructed. The 14 flumes on this system were given two coats of paint, and 4 bridges, 2 bulkheads, 3 drops, 1 chute, and miscellaneous taps and other structures were built.

Selig Canal system.—A contract was entered into under date of May 10, 1913, for the excavation of 6.2 miles of the Lower Selig Extension Canal, and 3.4 miles of the Peach Valley lateral. The contractor was unable to complete the work at the specified time on account of the severity of winter conditions and two extensions of time were as a consequence granted to him. The work was finally completed in February, 1914; 191,080 cubic yards were excavated and 930 linear feet of tunnel driven. A contract was entered into under date of December 22, 1913, for the excavation of 2.05 miles of the Lower Selig Extension Canal. The contractor was unable to complete the work at the specified time on account of the severity of the

winter season, and an extension of time was granted to him. The work was completed in April, 1914, 29,675 cubic yards being excavated. An informal contract was entered into under date of May 29, 1914, for the excavation of schedule 9 of the Upper Selig Extension Canal. This work was completed in June, 1914, 3,001 cubic yards being excavated. The four tunnels on the Lower Selig Extension Canal, together with their approaches were lined with concrete, 845 cubic yards of concrete being placed. One No. 168, 608 feet long, and one No. 156, 457 feet long, semicircular steel flumes of the Colorado Culvert & Flume Co. type were installed. These flumes have concrete approaches and are supported on a timber subbent foundation. Four bridges and one flood chute were also built on this system.

OPERATION AND MAINTENANCE.

During the season of 1913 the Reclamation Service supplied and distributed water for the irrigation of 31,428 acres of land, 19,190 acres of which were supplied from the Montrose and Delta Canal system; 6,885 acres from the Loutsenhizer Canal system; 3,817 acres from the South Canal system; and 1,536 acres from the West Canal system. The following private canals, North Mesa, Delta Chief, Homerun, Logan, Colorow, Chipeta, Selig, and Garnet, were supplied with Gunnison water and 6,054 acres were irrigated under them. During the season 182,191 acre-feet of water were diverted into the canals operated by the service, 160,056 acre-feet of this amount being delivered to the land. All water was furnished on a rental basis, the charge being $80 per second-foot per season for all consumers along the Montrose and Delta and South Canals; those consumers possessing water rights in the Loutsenhizer Canal were assessed $20 per second-foot for Uncompahgre water and $60 additional per second-foot for Gunnison water. Private canals were furnished with Gunnison water at the South Canal outlet at the rate of $60 per second-foot. The operation of the Gunnison Tunnel and South Canal continued until October 10, 1913, except for two shutdowns of two days to make minor repairs. Operation during the 1914 season began on these features on April 19, 1914. The Montrose and Delta Canal was operated continuously except for average weekly shutdowns in order to sluice out gravel from the headworks, and except for the shutdown on May 12 to repair the temporary dam at the headworks and also on June 8 and 9 to remove the sluiceway guide walls and gravel. The operation of the old High Mesa lateral was abandoned in August, 1913, on account of sidehill slipping, and it was necessary thereafter to furnish irrigating water for High Mesa through the siphon. Considerable trouble was experienced in operating this new lateral on account of excessive seepage near both ends of the siphon, due to the gravel and gypsum formation. Some difficulty was also experienced in operating the new Poverty Mesa lateral on account of the ground formation. The operation of all the other canals was practically continuous. During the irrigation season the operating force was employed in regulating the distribution of water and in making minor repairs, and during the remainder of the year the force was engaged in cleaning the canals of vegetable growth and deposits of sand and in repairing and installing structures.

Historical review, Uncompahgre Valley project.

Item.	1909	1910	1911	1912	1913	1914 (estimated).
Acreage for which service was prepared to supply water	20,600	24,000	30,000	44,500	48,000	58,000
Acreage irrigated	16,500	17,080	20,995	27,887	31,428	37,350
Miles of canal operated	117.5	129.2	131.0	210.7	228.0	238.0
Water diverted (acre-feet)	73,988	106,335	112,708	139,932	182,191	200,000
Water delivered to land (acre-feet)	73,988	106,765	113,789	133,912	160,056	186,750
Per acre of land irrigated (acre-feet)	4.5	6.25	5.44	4.81	5.09	5.00

SETTLEMENT.

No public land under this project is open to entry at the present time, and no public notices have been issued. The only settlement that has taken place in the past few years has been due to either the transfer of private lands or to entries made prior to July 27, 1908. Many owners have subdivided their holdings and have sold small tracts to new settlers. Pepper & Co., owners of an old stock ranch of several hundred acres west of Montrose, have worked up a unique and successful method of disposing of their excess holdings. The ranch was cut up into 5, 10, and 20 acre farms, with roads, lateral ditches to each tract, and connections with the Olathe city water supply, put in for domestic use. These farms were then sold to prospective farmers without any cash payment down. Each purchaser contracted to pay a certain percentage of his crop on the purchase price of the land. Sales have been made at about $200 per acre, but no more than 20 acres were sold to an individual.

There is no experiment farm on the project, but considerable interest is manifested in the work the Colorado Agricultural College is accomplishing in experimental work. Once each year an agricultural special train passes through the State and spends several hours in each town. Exhibits of various crops are shown and lectures given, and this yearly demonstration has proven to be of great interest and success. The farmers in various localities have formed clubs and are doing much beneficial work in a cooperative way. A farmers' grange has been organized, the chief purpose being to secure better prices in supplies that have to be purchased. For instance, coal, sugar, flour, lumber, etc., are purchased in carload lots and a consequent saving to the farmers is thereby effected.

Settlement data, Uncompahgre Valley project.

Item.	1912	1913	1914
Total number of farms on project	1,245	1,344	1,470
Population of	5,171	4,265	5,200
Number of irrigated farms	1,245	1,344	1,470
Operated by owners or managers	No data.	839	920
Operated by tenants	No data.	505	550
Population of	5,171	4,265	5,200
Number of towns	3	3	3
Population of	6,320	6,400	6,500
Total population in towns and on farms	11,491	10,665	11,700
Number of public schools	No data.	26	22
Number of churches	No data.	No data.	22
Number of banks	No data.	No data.	8
Total capital stock	No data.	No data.	$425,000.00
Total amount of deposits	No data.	No data.	$1,692,612.64
Total number of depositors	No data.	No data.	5,950
Number of relinquishments	2	.....	.....
Number of cancellations	7	4	1

PRINCIPAL CROPS.

The season of 1913 was a fair crop year, with better than average prices, and has improved the financial condition throughout the valley. Alfalfa, potatoes, oats, wheat, sugar beets, and apples had the largest acreage in the order named. Onions, apples, potatoes, garden and sugar beets, in the order named, gave the largest return per acre of crop. Potatoes, alfalfa, apples, sugar beets, wheat, and oats, in the order named, gave the largest per cent of total returns. The potato crop was slightly below normal on account of the extremely dry spring. The alfalfa, wheat, and oat yield was about normal, and the apple crop was slightly above normal. Very little smudging was required during the growing of the fruit crop. The sugar-beet yield was below normal, due to the dry spring and shortage of water under some canals at critical periods. Onions averaged a fair yield, but the acreage was low on account of the low prices received during 1912. The outlook for 1914 is very good. The fruit is in excellent condition and no damage whatsoever has been experienced from the spring frosts. The yield from the first cutting of alfalfa was rather light and some slight damage was done to this crop by the ravages of a species of cut worm. The sugar-beet acreage will be rather low on account of the reduction in contract prices offered by the sugar factories for the 1914 season.

Crop report, Uncompahgre Valley project, year of 1913.[1]

Crops.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa hay	10,545	Ton	28,715	2.7	$7.48	$214,854	$20.32
Alfalfa seed	18	Bushel	29	1.6	9.38	272	15.11
Apples	1,561	Pound	7,099,950	4,548	.018	128,927	82.59
Barley	97	Bushel	3,815	39.3	.37	1,421	14.65
Beans	55	do	752	13.7	2.34	1,762	32.00
Beets, sugar	2,262	Ton	16,971	7.5	5.45	92,471	40.88
Clover hay	144	do	81	.6	7.36	596	4.14
Clover seed	20	Bushel	15	.8	12.00	180	9.00
Corn, Indian	117	do	4,683	40.0	1.00	4,672	40.28
Corn fodder	57	Ton	138	2.4	5.63	777	13.63
Fruit, small	40	Pound	42,168	1,054	.077	3,240	81.00
Garden	81					4,030	50.00
Hay	444	Ton	574	1.3	6.27	3,599	8.10
Oats	4,797	Bushel	139,247	29	.43	59,643	12.43
Onions	160	do	39,428	246.4	.68	26,872	167.95
Pasture	950					3,790	3.99
Peaches	195	Pound	1,825	9.4	.039	72	0.37
Pears	14	do	3,200	229	.05	160	11.43
Peas	241	Bushel	452	1.9	1.53	694	2.88
Prunes	23	Pound	94,500	4,108	.025	2,378	103.40
Potatoes, Irish	5,354	Bushel	725,055	135.4	.52	374,633	69.96
Rye	14	do	302	21.6	1.39	421	30.00
Wheat	3,931	do	85,192	21.7	.79	67,504	17.17
Miscellaneous	82					2,185	26.65
Less duplicated areas	836						
Total	30,366					995,153	32.77
Irrigated, no crop:							
Young alfalfa	2,214						
Nonbearing orchard	1,414						
Ground fall plowed	774						
Miscellaneous	60						
Less duplicated areas	3,400						
Total	1,062						
Total irrigated	31,428						

[1] Limited to areas irrigated from system operated by Reclamation Service, eliminating areas under private canals, included in reports for former years, even where these use some Gunnison water.

Crop report, Uncompahgre Valley project, year of 1913—Continued.

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	52,915	888
Total irrigated area farms reported	31,428	888
Under rental and carriage contracts	31,428	888
Total cropped area farms reported	30,366	888

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Uncompahgre Valley project, to June 30, 1914.

ASSETS.

Cash in other employees' hands awaiting transfer to fiscal agent		$16.20
Accounts receivable:		
Uncollected miscellaneous items		1,240.00
Inventories:		
Mercantile stores stock on hand	$95.00	
Animals	4,585.00	
Mechanical and other equipment	28,268.12	
Material and supplies on hand in storehouses	46,901.09	
Goods in transit	925.28	
Unadjusted transfers between projects	72.56	
Undistributed cost (freight and handling on inventory property)	700.76	
Total		81,547.81
Construction work in process:		
Gross expenditures for construction of project to date	5,613,095.20	
Less revenue earned during construction as follows:		
Rentals of cottages	$17,841.98	
Rentals of irrigation water	231,791.39	
Profits on mess houses	8,488.88	
Profits on mercantile stores	20,792.55	
Profits on hospitals	1,353.10	
Contractors' freight refunds	2,646.66	
Adjustments:		
Depreciation on plant and equipment	3,269.49	
Profits shown on Government animals	10,409.95	
Total deductions	296,594.00	
Net expenditures for construction of project to date		5,316,501.20
Total assets		5,399,305.21

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$8,206.88	
Unpaid purchases	4,745.69	
Unpaid contract estimates	105.78	
Unpaid contract holdbacks	100.00	
Unpaid freight and express charges	5,947.30	
Unpaid passenger fares	93.40	
Unpaid agreements to purchase real estate	1,214.00	
Unredeemed coupon books	444.35	
Unredeemed meal tickets	52.50	
Total		20,909.90

Net investment:			
Disbursements	$5,627,007.73		
Transfers received from other projects	131,579.04		
		$5,758,586.77	
Less—			
Collections	351,396.62		
Transfers issued to other projects	28,794.84		
		380,191.46	
Total			$5,378,395.31
Total liabilities, reserves, and capital investment of the Government			5,399,305.21

Functional feature costs of Uncompahgre Valley project to June 30, 1914.

Development (storage) works	$12,111.53
Carriage system	3,744,789.89
Distribution system	1,194,540.91
Drainage and flood protection system	776.04
Power system	262.50
Real estate	15,776.31
Telephone lines	6,190.45
Farm unit subdivisions	3,224.23
Roads and bridges	24,376.78
Miscellaneous preliminary investigations	277,205.94
Operation and maintenance during construction	333,840.62
Gross building expenses of project to date	5,613,095.20

Estimated cost of contemplated work, Uncompahgre Valley project, during fiscal year 1915.

Development (storage) works:		
Taylor Park Dam		$5,000.00
Carriage system:		
Gunnison Tunnel	$100,000.00	
Gunnison River weir	5,000.00	
South Canal system	16,000.00	
		121,000.00
Distribution system:		
Purchase of canals and rights of way	150,000.00	
Buildings	4,000.00	
South Canal system	3,000.00	
Montrose and Delta Canal system	29,000.00	
Loutsenhizer Canal system	4,000.00	
East Canal system	157,000.00	
West Canal system	25,000.00	
Selig Canal system	122,000.00	
Ironstone Canal system	168,000.00	
Garnet Canal system	5,000.00	
		667,000.00
Drainage and flood protection system: South Canal		1,000.00
Farm unit subdivisions		2,000.00
Roads and bridges:		
Montrose and Delta system	1,000.00	
East Canal system	3,000.00	
Selig Canal system	3,000.00	
Ironstone Canal system	2,000.00	
		9,000.00

Operation and maintenance during construction:		
Gunnison Tunnel	$9,000.00	
South Canal system	20,000.00	
Montrose and Delta system	20,000.00	
Loutsenhizer Canal system	6,000.00	
West Canal system	6,000.00	
East Canal system	8,000.00	
Selig Canal system	8,000.00	
Garnet system	3,000.00	
Contingencies	20,000.00	
		$100,000.00
Total		905,000.00

IDAHO, BOISE PROJECT.

G. H. Bliss, project manager, Boise, Idaho; C. H. Paul, construction engineer, Arrowrock Dam, Arrowrock.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Ada, Boise, Canyon, and Elmore.

Townships: 1 S. to 5 N., Rs. 6 W. to 6 E., Boise meridian, and Tps. 21 and 22 S., R. 46 E., Willamette meridian.

Railroads: Oregon Short Line; Boise, Nampa & Owyhee; Idaho Northern; Idaho Traction; Arrowrock.

Railroad stations and estimated population January 1, 1914: Boise, 20,000; Nampa, 4,500; Caldwell, 4,000; Meridian, 650; and Kuna, 200.

WATER SUPPLY.

Source of water supply: Boise River.

Area of drainage basin: 2,610 square miles.

Annual run-off in acre-feet of Boise River near Highland (2,610 square miles), 1895 to 1913: Maximum, 3,100,000; minimum, 1,200,000; mean, 2,500,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water season 1914, 243,000 acres, including 18,000 acres of lands in territory of New York Canal Co. and 36,000 acres of doubtful land.

Area under water-right applications and rental contracts season 1914, 84,360 acres; under special contracts, 18,000 acres.

Length of irrigation season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 2,500 feet above sea level.

Average annual rainfall on irrigable area: At Boise station for 35 years, 13.50 inches; 1913, 16.04 inches. Year considered comparatively wet.

Range of temperature on irrigable area: —28° to 107° F.

Character of soil of irrigable area: Clayey loam, light sandy loam, and sandy loam.

Principal products: Alfalfa, wheat, oats, potatoes, apples, prunes, and small fruit.

Principal markets: Boise, Nampa, Caldwell, and Meridian, Idaho; Portland, Oreg.; and eastern cities.

LANDS OPENED FOR IRRIGATION.

The project has not yet been formally opened.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1902.

Construction recommended by board of engineers February 15, 1905.

Construction authorized by Secretary March 27, 1905.

Main canals of New York Canal Co. and Idaho-Iowa Lateral & Reservoir Co. acquired March 3, 1906.

First irrigation by Reclamation Service, season of 1906.

Boise River Dam completed September, 1908.

Arrowrock Dam construction authorized January 6, 1911.

Upper Deer Flat embankment completed March, 1911.

Deer Flat Forest embankment completed June, 1911.
Lower Deer Flat embankment completed January, 1912.
Boise River power plant completed May, 1912.
Pioneer district drainage started in November, 1913.
Project, exclusive Boise River storage and exclusive Pioneer drainage, 80 per cent completed June 30, 1914.
Pioneer drainage 30 per cent completed June 30, 1914.
Project, inclusive of Boise River storage and Pioneer drainage, 66 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Boise project provides for storage of water in the Arrowrock Reservoir on Boise River about 20 miles above Boise and in the Deer Flat Reservoir near Caldwell and Nampa, Idaho; the diversion of water from Boise River by the Boise River Dam about 8 miles above Boise; the distribution of water on the south side of Boise River through the Main Canal leading from the dam to the Deer Flat Reservoir; distributing laterals heading in the Main Canal; distributing canals heading in the Deer Flat Reservoir; and distributing canal systems heading in the Boise River below the Boise River Dam; and the distribution of water on the north side of the Boise River to a small area of land east of Boise through a canal system heading at the Boise River Dam. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith. The Boise River Dam, the Deer Flat Reservoir, and the entire canal system, except a few minor ditches and structures, are completed. Construction work on the Arrowrock Reservoir is in progress.

CONSTRUCTION DURING FISCAL YEAR.

Storage unit (Arrowrock Dam and related features).—The Boise power plant has furnished all the electric power necessary for the construction work at Arrowrock, and a large amount of the surplus, amounting to about 40 per cent of the output during the year, has been sold to the Idaho-Oregon Light & Power Co.

The Boise & Arrowrock Railroad has been operated successfully throughout the entire year. At the beginning of the working season of 1914 the railroad crew was reorganized, and, in addition to the regular freight and passenger train, gravel trains hauling concrete material from the screening plant at diversion dam to the concrete plant at Arrowrock were put into service, and have since been operating two shifts per day.

Operations at the Cottonwood sawmill were continued until all the available timber within easy reach of the mill had been cut and sawed into lumber. The mill was then dismantled and the machinery put in storage.

The second section of the dam, which was started early in the fiscal year, was completed during the working season of 1913. With the exception of a small section across the lava bench on the south side of the river, the whole dam is now completed up to about elevation 3060, and the highest section is completed to about elevation 3100, which is about 240 feet above the lowest point of bedrock. Nearly 300,000 cubic yards of concrete have been placed during the fiscal year.

The concrete-mixing plant was moved and remodeled during the winter of 1913–14, since all the concrete material available from the river-bed excavation had been used up, and a plant of different design was needed to handle concrete material brought in on the railroad.

All excavation is completed, excepting a small amount of trimming of abutments as the concrete work progresses, and the removal of some lava rock until suitable foundation is reached for the short section of the dam just mentioned, on the south side of the river.

The rough excavation on the spillway was completed during December, 1913, and the bottom and slopes of the spillway trench are now being trimmed up preparatory to placing the reinforced-concrete lining.

The gravel pit where concrete material for the completion of the dam is being obtained was opened up along the line of the railroad near diversion dam, and the steam-shovel outfit has been moved to that point, where it is being operated two shifts per day. A screening plant was also erected at that point, where this material is being screened before being hauled to Arrowrock.

The sand-cement plant has been operated throughout the year during the time that concrete operations have been carried on and has furnished all the sand cement required for the construction of the dam. The total output of the mill during the fiscal year has been about 280,000 barrels.

The five 5-foot slide gates for the sluicing outlets at river level have been delivered, and their installation is completed. The seven regulating outlets and the three power outlets through the dam at elevation 3018 have been built, and the balanced valves for these outlets, as well as for the 10 regulating outlets at elevation 3105, have been contracted for.

A rolling dam was installed in the logway at diversion dam for the purpose of getting a greater available head at the Boise power plant and a greater maximum flow into the New York Canal during the low-water period.

Main Canal.—During the year very little construction work has been undertaken on the Main Canal with the exception of a reinforced-concrete stand box at the outlet of Eagleson-Kerr tap, station 436, and the graveling and paving of a considerable portion of the banks of the Main Canal above Indian Creek to prevent erosion.

Deer Flat Reservoir.—No construction work has been undertaken except the puddling of new land, flooded for the first time during the season of 1913. The reservoir was filled during the year to a height of 24.6 feet above the sill of the gates, a depth of 7 feet remaining at the end of the irrigation season.

Wasteways.—Additional wasteways were provided to control more effectively the delivery of water; the Sunnyslope wasteway was straightened and concrete lined; and better wasteways were provided at the end of the Nordica, Fargo High Line, Teed, and Ramsey laterals, and from the Mora Canal through Bernard Gulch.

DRAINAGE.

Under the provision of a contract entered into with the Pioneer irrigation district, drainage work was begun in that district in November, 1913. From that time until the end of the fiscal year the work was prosecuted practically continuously by means of two electrically operated, drag-line excavators. On July 30, 1914, the Elijah and Mason Creek drains were about completed. These are both open drains located in natural depressions. They are intended to serve

for carrying the surface waters which accumulated from irrigation and other sources in these low depressions, as well as for lowering and controlling the ground waters. The drains are consequently classed as deep drains.

In all of the drains so far constructed large amounts of water have been developed. This has resulted in a drying up and lowering of the ground-water table in the slough. The effect of this lowering of the water table in the depressions is also to cause a general lowering over the higher areas adjacent thereto which were gradually becoming threatened. The results so far accomplished seem to indicate that deep open drains so located in the low depressions as to intercept the underground flow toward them will be effective in a great measure in lowering and controlling the water table of the district. These drains will also act as main outlets for the drainage of the project lands situated above the Pioneer district.

In addition to the drainage work carried on in the Pioneer district preliminary surveys and estimates have been made covering drains in portions of the Nampa-Meridian and Fargo districts.

OPERATION AND MAINTENANCE.

During the season of 1913, 76,265 acres were actually irrigated, including 18,000 acres of New York Canal Co.'s lands, as compared with 61,725 acres in 1912. The water obtained by Government water users was rented at 40 cents per acre-foot for early water and 60 cents per acre-foot for late water. The average amount used was 2.38 acre-feet, at an average cost of approximately $1.20 per acre. The right of the United States to divert water from the Boise River terminated on July 11 with the exception of a short period thereafter when water again became available through heavy rains. Water was available after the termination of the flood-water right in Boise River by an exchange of the water in the Deer Flat Reservoir for the older rights of the Riverside and Phyllis canals and transfer to the Main Canal at the Boise River diversion dam for rotation on the land above the Deer Flat Reservoir. The rotation of the water onto the higher lands proved to be of considerable value to the water users on those lands and resulted in their obtaining generally very satisfactory crops.

Pending the construction of the Arrowrock Reservoir, which is now about one-half completed, and which will furnish late water to all lands above the Deer Flat Reservoir, these lands do not have a complete water right, and exchange water must be resorted to in order to carry them through the season.

Idaho-Iowa Lateral & Reservoir Co.'s reservoirs.—In accordance with the contract entered into March 3, 1906, between the United States and the Idaho-Iowa Lateral & Reservoir Co., the Kuna, Watkins, and Catherine reservoirs have been filled by the United States during the year.

Maintenance.—During the year a number of wooden structures, mostly checks and weirs, have been replaced with concrete or rubble masonry structures of a permanent type. Several small wasteways and chutes have been mortar and cobble lined to prevent erosion. All of the canals and laterals have been given a thorough cleaning and repairing and placed in excellent operating condition. Several

thousand feet of the banks of the Main Canal above Indian Creek have been gravel lined or paved to prevent wave action. Most of the maintenance work accomplished during the year was in connection with the repair of small structures and ditches. No serious breaks in the canals occurred, and the flow of water was constant and satisfactory.

Historical review, Boise project.

Item.	1909	1910	1911	1912	1913	1914
Acreage for which service was prepared to supply water	42,000	90,000	120,000	200,000	[1] 207,000	[1] 207,000
Acreage irrigated	21,300	33,377	45,575	61,725	76,265	84,360
Miles of canals operated	193	340	624	966	969	971
Water diverted (acre-feet)	177,124	232,181	337,963	370,056	495,470	509,206
Water delivered to land per acre of land irrigated (acre-feet)	2.39	1.67	1.79	1.93	2.38	[2]

[1] In addition there are 36,000 acres of land included under the system which because of a partial water right are classed as doubtful.
[2] Not yet determined.

SETTLEMENT.

Conditions pertaining to settlement have not changed materially during the year and the present population is considered fairly permanent. All of the public land subject to filing has been entered, and there remain unentered only 91 farm units that under the acts of June 25, 1910, and February 18, 1911, are not subject to entry until the project is opened. Comparatively few farm units have been assigned or relinquished during the year. A small acreage of State land under the project has been sold, and a few pieces of private land have changed hands. There are 387 water users under the project who have submitted permanent water-right applications during the year.

Settlement data, Boise project.

Item.	1912	1913	1914
1. Total number of farms on project	2,391	2,450	2,600
2. Population of (1)	7,000	7,500	8,000
3. Number of irrigated farms	1,223	1,575	1,771
4. Operated by owners or managers	1,050	1,350	1,521
5. Operated by tenants	173	225	250
6. Population of (3)	3,669	4,275	5,313
7. Number of towns	9	10	10
8. Population of (7)	30,000	30,350	30,400
9. Total population in towns and on farms	37,000	37,850	38,400
10. Number of public schools	16	18	20
11. Number of churches	40	45	50
12. Number of banks	10	11	11
13. Total capital stock	[1]	[1]	$1,505,000.00
14. Total amount of deposits	[1]	[1]	$7,326,479.23
15. Total number of depositors	[1]	[1]	27,038
16. Number of relinquishments	[1]	15	10
17. Number of cancellations	None.	None.	None.

[1] No record.

PRINCIPAL CROPS.

During the season of 1914 there are approximately 84,360 acres of land under the Boise project in actual cultivation, including 18,000 acres irrigated with New York Canal water. Of this, 33,740 acres,

or 40 per cent, are in hay; 38,700 acres, or 46 per cent, in grain and seed crops; 4,200 acres, or 5 per cent, in orchard; and 7,720 acres, or 9 per cent, in miscellaneous crops. The average crop returns for 1913 were more satisfactory than during any previous year, although the grain crop, due to continued hot weather, was lighter than during average years. The largest increase in acreage of any variety of crop during 1913 was that for clover, which was cropped principally for seed with gratifying returns, the yield being large and the seed of good quality. The prospects of a good yield for all crops during 1914 are excellent.

Crop report, Boise project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa hay	15,428	Ton	54,162.5	3.5	$5.50	$297,894	$19.31
Alfalfa seed	344	Bushel	598.8	1.74	7.20	4,311	12.54
Apples	91	Pound	739,970.0	8,095.95	.015	11,100	121.44
Artichokes	5	Bushel	600.0	120.00	.33⅓	200	40.00
Barley	2,315	do	43,269.9	18.69	.50	21,635	9.34
Beans	119	do	1,414.9	11.92	2.70	3,820	32.18
Beets, mangle	1	Ton	5.0	10.00	8.00	40	80.00
Beets, sugar	2	do	10.0	5.00	8.00	80	40.00
Clover hay	1,368	do	2,111.8	1.54	7.00	14,783	10.81
Clover seed	3,244	Bushel	15,056.9	4.64	7.50	112,927	34.81
Corn, broom	65	Ton	28.6	.44	60.00	1,716	26.40
Corn, Indian	2,862	Bushel	57,819.0	20.19	.70	40,473	14.14
Corn, pop	40	Pound	60,130.0	1,484.7	.02½	1,503	37.12
Corn, fodder	96	Ton	313.9	3.27	7.00	2,197	22.89
Fruit, small	6	Pound	25,988.0	4,260.4	.017	456	74.75
Garden	459	Acre				20,576	44.78
Hay, except as above	563	Ton	722.5	1.28	7.00	5,057	8.98
Melons	3	Acre				35	11.67
Millet seed	48	Bushel	326.0	6.76	.150	489	10.14
Oats	6,877	do	167,464.2	24.35	.30	50,239	7.31
Onions	9	do	747.0	81.2	.50	374	40.60
Onion seed	10	Pound	2,052.0	205.2	.25	513	51.30
Pasture	2,976	Acre				27,493	9.24
Peaches	39	Pound	26,000.0	658.2	.0125	325	8.23
Peas	30	Bushel	148.7	4.9	4.20	625	20.68
Prunes	8	Pound	36,168.0	4,636.9	.0125	452	57.96
Potatoes, common	1,255	Bushel	113,087.8	90.1	.50	56,544	45.05
Potatoes, sweet	13	Pound	26,340.0	1,951.00	.035	922	68.29
Rye	315	Bushel	1,061.5	3.4	.60	637	2.02
Spelts	2	Ton	8.0	4.00	8.00	64	32.00
Wheat	12,042	Bushel	190,172.3	15.8	.66	125,514	10.42
Less duplicated areas	1,447						
Total	[1]49,191					[1]802,994	[1]16.32
Irrigated, no crop:							
Nonbearing orchard	6,063						
Young alfalfa and young clover	5,892						
Ground, fall plowed	1,053						
Miscellaneous	588						
Less duplicated areas	6,440						
Total	7,156						
Total irrigated	56,347						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	86,130	1,377
Total irrigated area farms reported	56,347.1	1,377
Under rental contracts	56,347.1	1,377
Total cropped area farms reported	49,191.4	1,377

[1] Exclusive of 79 farms of 1,918 irrigated acres from which data not available, and 315 farms of 18,000 irrigated acres of New York Canal lands.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Boise project, to June 30, 1914.

ASSETS.

Cash in other employees' hands awaiting transfer to fiscal agent		$26.84
Accounts receivable:		
Uncollected water rentals	$559.83	
Uncollected miscellaneous items	17,015.56	
		17,575.39
Inventories:		
Mercantile stores stock on hand	9,531.93	
Animals	12,196.15	
Mechanical and other equipment	356,467.29	
Materials and supplies on hand in storehouses	88,206.77	
Goods in transit	22,130.80	
Unadjusted transfers between projects	1,299.49	
Undistributed cost (freight and handling on inventory property)	3,051.63	
		492,884.06
Construction work in process:		
Gross expenditures for construction of project to date		9,837,639.56
Revenue earned during construction, as follows:		
Rentals of cottages	16,768.37	
Rentals of grazing lands	11,449.67	
Rentals of irrigating water	189,045.33	
Rentals of power and light	49,786.90	
Miscellaneous revenues	555.24	
Profits on mess houses	47,420.97	
Profits on mercantile stores	33,708.55	
Loss on hospitals	[1] 4,239.23	
Contractors freight refunds	13,030.71	
Forfeiture by defaulting bidders and contractors	19,167.92	
Adjustments:		
Depreciation on plant and equipment	218,360.73	
Profit shown on Government animals	22,484.04	
Profit on operation Boise & Arrowrock Railroad	31,496.98	
Total deduction		649,036.18
Net expenditures for construction of project to date		9,188,603.38
Total assets		9,699,089.67

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$66,517.94	
Unpaid purchases	93,012.66	
Unpaid freight and express charges	135,973.36	
Unpaid passenger fares	158.67	
Unpaid agreements to purchase real estate	475.00	
Unredeemed coupon books	804.22	
Unredeemed meal tickets	312.76	
Unpaid miscellaneous	2,694.69	
Total		299,949.30

[1] Deduct.

Net investment:			
Disbursements	$9,566,339.09		
Transfers received from other projects	325,558.85		
		$9,891,897.94	
Less—			
Collections	402,586.40		
Transfers issued to other projects	90,171.17		
		492,757.57	
Total			$9,399,140.37
Total liabilities, reserves, and capital investment of the Government			9,699,089.67

Functional feature costs of Boise project to June 30, 1914.

Development (storage) works	$4,445,356.71
Carriage system	2,031,597.91
Distribution system	2,185,943.81
Drainage and flood protection	173,836.54
Power system	235,932.75
Real estate	21,749.07
Telephone lines	34,377.50
Farm-unit subdivisions	63,521.17
Roads and bridges	71,300.02
Miscellaneous preliminary investigations	66,961.83
Operation and maintenance during construction	466,752.70
Cost ledger inventories	40,309.55
Gross expenditures for construction of project to date	9,837,639.56

Estimated cost of contemplated works, Boise project, during fiscal year 1915.

Development (storage) works:		
Arrowrock Reservoir	$1,400,000.00	
Purchase power rights, Boise River	20,000.00	
Deer Flat Reservoir	20,000.00	
		$1,440,000.00
Distribution system:		
Supplemental construction	35,000.00	
From Main Canal	25,000.00	
From Deer Flat Reservoir	35,000.00	
		95,000.00
Drainage and flood protection:		
Pioneer irrigation district	230,000.00	
Nampa and Meridian irrigation district	75,000.00	
Fargo drainage	50,000.00	
Miscellaneous	25,000.00	
		380,000.00
Telephone lines		500.00
Farm units, subdivision maps, etc.:		
Subdivision into farm units	6,000.00	
Farming Government lands	1,000.00	
Duty of water investigations	5,000.00	
		12,000.00
Roads and bridges		2,000.00
Miscellaneous preliminary investigations (water supply)		3,000.00
Operation and maintenance during construction		160,000.00
Total		2,092,500.00

IDAHO, MINIDOKA PROJECT.

H. M. Schilling, project manager, Rupert, Idaho.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Lincoln and Cassia, Idaho; Jackson Lake Reservoir, Uinta, Wyo.

Townships: 8 to 11 S., Rs. 22 to 25 E., Boise meridian; Jackson Lake Reservoir, Tps. 44 to 46 N., Rs. 114 to 116 W., sixth principal meridian, Wyoming.

Railroads: Oregon Short Line; Salt Lake & Idaho.

Railroad stations and estimated population January 1, 1913: Rupert, 1,000; Heyburn, 300; Burley, 1,700; Ashton, 600; Paul; and Marshfield.

WATER SUPPLY.

Source of water supply: Snake River supplemented by storage.

Area of drainage basin: 22,600 square miles above diversion dam.

Annual run-off in acre-feet of Snake River at Montgomery Ferry and Neely (16,000 square miles), 1896 to 1913: Maximum, 8,900,000; minimum, 3,830,000; mean, 6,985,000. South Fork of Snake River at Moran, Wyo. (980 square miles), 1904 to 1913: Maximum, 1,640,000; minimum, 920,000; mean, 1,330,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: 116,400 acres.

Area under water-right applications and rental contracts, season of 1914: 104,205 acres.

Length of irrigating season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 4,225 feet above sea level.

Average annual rainfall on irrigable area; 8¾ years, 12.68 inches; 1913, 12.16 inches. Relatively dry.

Range of temperature on irrigable area: —11° to 100° F.

Character of soil of irrigable area: On north side of river sand and sandy loam predominate; about one-third of the area is clay loam. On the south side of the river the soil is a disintegrated lava ash.

Principal products: Alfalfa, grasses, rye, wheat, oats, sugar beets, potatoes, small fruit.

Principal markets. Pocatello, Idaho; Salt Lake, Utah; Butte and Helena, Mont.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto (gravity unit): Public notices—March 9, 1907; November 23, 1908; February 11, March 30, 1909; February 7, March 22, June 10, October 13, November 3 and 25, 1910; January 23, December 30, 1911; March 21, 1912. Orders—July 19, December 10, 1907; July 9, 1908; December 27, 1910; March 18 and 31, May 4, June 8, 1911; February 26, March 19 and 25, July 21, 1913; January 19, March 26 and 31, 1914. (South side pumping unit): Orders—March 24, 1911; March 19, May 13, October 10, 1912; March 25, 1913; March 23, 1914.

Location of lands opened: Tps. 8 to 10 S., Rs. 22 to 25 E., Boise meridian.

Present status of irrigable lands opened: 63,295 acres entered subject to the reclamation act; 929 acres open to entry; 6,914 acres of State land; 287 acres in private ownership.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 3 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $22, $30, and $40.
Annual operation and maintenance charge: $1.50 and $1.75 per acre of irrigable land. About 36,000 acres in the south side pumping unit were irrigated in 1913 on a rental basis.

CHRONOLOGICAL SUMMARY.

First surveys with reference to storage possibilities in 1902.
Reconnoissance and preliminary surveys for main project begun March, 1903.
Construction recommended by board of engineers March 21, 1904.
Construction authorized by Secretary April 23, 1904.
Minidoka Dam completed September, 1906.
Temporary dam on the Moran site, Jackson Lake, completed in 1907.
First irrigation by Reclamation Service, season of 1907.
Jackson Lake Dam completed November 25, 1911.
Contract for enlargement of Jackson Lake reservoir entered into February 25, 1913.
Gravity unit 86 per cent completed June 30, 1914, including drainage.
South side pumping unit 95 per cent completed June 30, 1914.
Entire project 91 per cent completed June 30, 1914, including drainage.

IRRIGATION PLAN.

The irrigation plan of the Minidoka project provides for the diversion of the waters of Snake River by a combined storage, diversion, and power dam about 6 miles south of Minidoka, Idaho, into two canal systems, one on either side of the river, watering lands in the vicinity of Acequia, Rupert, Heyburn, and Burley, Idaho. Power developed at the dam is utilized primarily for pumping water from the canals to irrigate high lands, but also for pumping for drainage purposes, and for furnishing heat, light, and current for commercial use to the towns on the project and the farms adjacent to them. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith. Storage for the project is provided mainly by a reservoir constructed in the upper drainage basin of Snake River, at Jackson Lake, Wyo. This is supplemented by the reservoir formed by the Minidoka Dam and known as Lake Walcott. Jackson Lake Dam, as originally planned, and Minidoka Dam are completed. It is now proposed to raise Jackson Lake Dam 17 feet. The irrigation system for the gravity unit and the south side pumping unit and the drainage system for the gravity canals are under construction.

CONSTRUCTION DURING FISCAL YEAR.

Buildings.—Three frame cottages were built at the diversion dam for the accommodation of employees.

Radial gates.—During the fall of 1913 a series of four radial gates, each 10 feet wide by 12 feet high, was installed in the spillway of the Minidoka Dam to aid in regulating the discharge of water from Lake Walcott and also to permit water to be drawn below the spillway crest if desired.

North Side Canal system.—The rebuilding of laterals in the gravity unit was continued and several weirs and orifices were installed. The West End pumping system was operated throughout the season and gave satisfactory service. Two small pumping stations were built and operated, one on the A–4 Canal and the other at the head of the 1812 lateral. A concrete siphon was built under the railroad track about 1 mile southwest of Rupert.

South Side Canal system.—The "B" feeder canal was enlarged to its ultimate capacity. A large number of measuring devices were installed at the heads of the laterals. New runners were put in three of the pumps at the first-lift pumping station, increasing their ca-

pacity from 20 to 32 per cent. Other pumps will be enlarged during the fall of 1914. Several short sections of laterals were constructed. A concrete siphon under the railroad track was built on the G–16–B lateral.

Commercial power.—There was a large increase in the sale of power for commercial use. At Rupert three 350-kilowatt transformers were installed to replace three 75-kilowatt transformers which were moved to Heyburn. A transformer station was erected at Burley. A transmission line was built from the pumping stations to Burley and Heyburn, thus providing duplicate lines over the entire system.

Jackson Lake Dam Enlargement.—This work, which was begun early in 1913, was suspended later in the year on account of financial difficulties of the Twin Falls Canal Co. These difficulties were overcome, however, sufficiently to permit work to be resumed in the spring of 1914, under the supervision of the Reclamation Service.

Jackson Lake was filled to its capacity of 380,000 acre-feet in the spring of 1914, the water distribution being, as heretofore, in charge of a deputy State engineer.

DRAINAGE.

Excavation was continued on the lands under the Main North Side Canal with two steam drag-line excavators, two electric drag-line excavators, and one suction dredge. Exceptionally good results were obtained from the electric machines. A number of pumping stations were operated throughout the year. At the end of the fiscal year the major portion of the drainage work so far as outlined had been completed.

Construction during the year consisted of a continuation of excavation of deep open drains which are intended to effect a general lowering of the water table on the project. On account of the very porous nature of the subsoils these deep drains are effective at long distances from them, and the system as planned and constructed is apparently sufficient for protecting the greater portion at least of the lands from seepage, provided due care is exercised in the use of water. Where excessive irrigations are indulged in it is possible to raise the water table near enough to the surface to interfere with agricultural operations and thus produce a temporary condition of seepage before the excess applied to the soils can reach the drains. Future drainage work is consequently to a large extent dependent upon the amount of water applied to the lands in irrigation.

Supplementary to the drainage system a silting plant was established on the Main North Side Canal, about 2 miles below its head. At this point there is a large body of clay which is being hydraulically sluiced into the canal and thence carried down the distributing system until it is finally deposited on the bottom and sides of the canals. It is hoped in this way to check seepage losses in the canals and thus reduce the necessity for drains. It is not yet possible, however, to determine whether the desired results have been obtained.

North Side Canal system.—About 320 linear feet of the A–4 Canal were lined with concrete to stop seepage on adjacent land.

South Side Canal system.—A concrete drop was constructed in the Main South Side waste canal which will permit the canal below the

drop to be lowered about 6 feet. It is hoped that the water plane will be lowered correspondingly and the seepage of adjacent lands stopped.

SURVEYS.

A complete survey was made of all borrow pits and rights of way and a revised list of farm-unit areas was prepared. A survey was also made of the flow line of certain portions of Lake Walcott.

OPERATION AND MAINTENANCE.

The early part of the season of 1914 was characterized by an unusually heavy demand for water, especially on the North Side. To meet this demand the discharge of the main canal increased rapidly until it reached more than 1,500 second-feet.

On May 30, while the canal was carrying 1,465 second-feet, a serious break occurred about 3 miles from the head. The work of repair was rapidly pushed and on June 3 a small amount of water was turned into the canal. By June 12 it was carrying its normal capacity. No damage to crops resulted on account of a shortage of water, although a few farms were injured by flooding.

Operation of the pumps on the South Side was begun on April 30, and was continued without interruption. On account of the change in the pump runners, a much larger supply of water is being furnished this year than formerly. In October, 1913, an attempt was made to raise the water in the Main South Side Canal to the normal depth of 6 feet, when a break occurred about 5 miles from the head. It was quickly repaired, with only slight damage to adjacent farms.

The West End pumping station was operated throughout the year and about 500 acres were watered therefrom. The A–4 pumping system began furnishing water in the spring of 1914. Approximately 700 acres will be irrigated from this plant. A small pumping station to water about 75 acres was built on the 1812 lateral under a plan of cooperation between the service and the settlers, and was put into operation.

The total acreage irrigated in 1914 is estimated at about 81,000 acres, of which 46,000 acres are on the gravity unit and 35,000 acres on the South Side pumping unit.

It is expected that the run-off in Snake River in 1914 will be about normal and that there will be an abundant water supply for the project.

A large number of laterals have been taken over during the year for operation by the service. At the present time only about 10 per cent of the laterals still remain in the hands of the settlers.

Historical review, Minidoka project.

Item.	1909	1910	1911	1912	1913	1914 [1]
Acreage for which service was prepared to furnish water	81,400	101,000	112,000	112,000	116,600	[1] 116,400
Acreage irrigated	43,500	46,000	55,600	70,200	76,000	[1] 81,300
Miles of canal operated	256	335	315	382	457	520
Water diverted (acre-feet)	387,300	442,000	466,300	440,200	489,200	.....
Water delivered to land (acre-feet)	[2]	336,170	327,100	304,172	383,000	.....
Per acre of land irrigated (acre-feet)	[2]	7.3	5.9	4.3	6.44	.....

[1] Estimated.

[2] Data not available.

SETTLEMENT.

Economic conditions on the project are improving. The farmers are learning how to raise crops and how to market them profitably. In this they have been aided by numerous cooperative organizations which include a producers' association, a potato growers' association, a creamery company, a Jersey breeders' association, and others of like nature. Several companies have been formed for building power lines over the project for furnishing electricity to the farmers. The plan for graduated payments of the construction charges also gave the settlers an opportunity to invest their money in improvements on their farms and so increase their productive capacity.

In 1913, the rural population of the project was estimated at 5,200, and the population of the towns at 3,000 additional. Many permanent and substantial buildings have been erected both in town and country. New settlers are constantly coming in who find farms for themselves on the project. This is accomplished largely, however, by subdivision of farm units with a corresponding increase in their number and a reduction in their size. It is believed that fewer of the early settlers are leaving than during former years.

Settlement data, Minidoka project.

Item.	1912	1913	1914
Total number of farms on project	2,109	2,092	2,113
Population of farms on project	[1] 4,400	4,800	5,200
Number of irrigated farms	1,606	1,708	1,741
Operated by owners or managers	1,406	1,496	1,525
Operated by tenants	200	212	216
Population of irrigated farms	.....	4,800	5,200
Number of towns	3	5	5
Population of towns	1,700	2,200	3,000
Total population of towns and farms	[1] 6,100	7,000	8,200
Number of public schools	.....	20	21
Number of churches	11	11	13
Number of banks	5	6	6
Total capital stock	$89,750.00	$97,500.00	$137,500.00
Total amount of deposits	$425,353.54	$547,234.84	$677,007.18
Total number of depositors	2,346	2,954	4,119
Number of relinquishments	[2]	9	.....
Number of cancellations	6	.....	.....

[1] Estimated. [2] No data.

PRINCIPAL CROPS.

Comparing the crop results for 1913 with those for 1912, it is seen that the acreage of alfalfa increased about 22 per cent; oats and beets decreased slightly in acreage, although their value showed an increase; potatoes increased in acreage more than 27 per cent; while wheat shows an increase of less than 1½ per cent in acreage, but nearly 18 per cent in value.

The outlook for 1914 is encouraging. The first cutting of alfalfa has been harvested, and the yield has been good. It is estimated that the acreage planted to potatoes is much greater than that of last year, and the general condition of the fields is excellent. Other crops are equally promising, and from present indications 1914 will be a profitable year.

Crop report, Minidoka project, gravity unit, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa	17,427	Ton	53,055	3.04	$5.50	$291,802	$16.74
Apples	250	Pound	136,681	546.72	.02	2,734	10.94
Barley	662	Bushel	20,147	30.43	.48	9,671	14.61
Beans	27	do	513	19.00	3.00	1,539	57.00
Beets, sugar	472	Ton	4,607	9.76	4.75	21,883	46.36
Clover hay	858	do	2,482	2.89	5.50	13,651	15.91
Clover seed	29	Bushel	141	4.86	6.60	931	32.10
Corn	211	do	3,928	18.62	.75	2,946	13.96
Corn fodder	5	Ton	9	1.80	5.75	52	10.40
Flax	9	Bushel	14	1.55	1.36	19	2.11
Fruits, small	54	Pound	25,913	479.87	.05	1,296	24.00
Garden	298					14,437	48.45
Hay (mixed)	620	Ton	1,393	2.25	6.25	8,706	14.04
Oats	5,608	Bushel	168,720	30.09	.36	60,739	10.83
Onions	15	do	1,475	98.33	$0.90–.60	1,237	82.47
Pasture	4,609					23,328	5.06
Pears	2	Pound	647	323.50	.025	16	8.00
Peas	46	Bushel	1,110	24.13	3.00	3,330	72.39
Prunes	4	Pound	850	212.50	.025	21	5.25
Potatoes	1,396	Bushel	210,355	150.68	.36	75,728	54.25
Rye	288	do	5,855	20.33	.566	3,314	11.51
Wheat	3,849	do	87,706	22.79	.60	52,624	13.67
Miscellaneous	381					3,101	8.14
Less duplicated areas	241						
Total	36,879					593,105	16.08
Irrigated, no crop:							
Nonbearing orchard	947						
Young alfalfa	4,161						
Ground, fall plowed	1,830						
Miscellaneous	969						
Less duplicated areas	913						
Total	6,994						
Total irrigated	43,873						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	65,143	1,125
Total irrigated area farms reported:		
Under water-right applications	43,373	1,125
Under rental contracts	500	
Total cropped area farms reported	36,879	

Crop report, Minidoka project, South Side pumping unit, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa	8,417	Ton	25,389	3.02	$5.50	$139,640	$16.59
Alfalfa seed	24	Bushel	90	3.75	6.60	594	24.75
Apples	12	Pound	16,750	1,395.83	.02	335	27.92
Barley	945	Bushel	23,315	24.67	.43	10,025	10.61
Beans	67	do	718	10.72	3.00	2,154	32.15
Beets	2,102	Ton	17,395	8.26	4.75	82,626	39.31
Clover	143	do	308	2.16	5.50	1,694	11.85
Clover seed	50	Bushel	170	3.4	6.60	1,122	22.44
Corn	52	do	530	10.19	.75	398	7.65
Corn fodder	18.5	Ton	54	2.92	5.00	270	14.59
Fruits, small	5	Pound	13,500	2,700	.05	675	135.00
Garden	307	Acre			50.00	15,350	50.00
Hay, mixed	39	Ton	57	1.46	6.25	356	9.13
Oats	4,853	Bushel	135,410	27.9	.38	51,456	10.60
Onions	.5	do	100	200	.90	90	180.00
Pasture	1,892	Acre			5.00	9,460	5.00

Crop report, Minidoka project, South Side pumping unit, year of 1913—Contd.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped—Continued.							
Pears	2	Bushel	10	5	$2.00	$20	$10.00
Peas	462	do	7,763	16.8	1.80	13,973	30.24
Potatoes	3,159	do	351,468	111.26	.36	126,529	40.05
Rye	7	do	105	15	.60	63	9.00
Wheat	6,825	do	144,195	21.13	.60	86,517	12.68
Less duplicated areas	20						
Total	29,362					543,347	18.51
Irrigated, no crop:							
Nonbearing orchard	493						
Young alfalfa	2,483						
Young clover	39						
Ground fall plowed	400						
Miscellaneous	1,303						
Less duplicated areas	1,996						
Total	2,722						
Total irrigated	32,084						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	35,071	523
Total irrigated area farms reported	32,084	523
Under rental contracts	32,084	523
Total cropped area farms reported	29,362	523

ORDER DATED MARCH 23, 1914.

1. Whereas, under the provisions of orders heretofore issued, water was furnished on a rental basis in 1911, 1912, and 1913 to lands in the South Side pumping unit, Minidoka project, Idaho, constructed under the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplemental thereto; and

2. Whereas a large number of the settlers or landowners are unable to comply with said orders and pay in full the rental charges heretofore announced, and it is desired to continue the development of the lands by irrigation in 1914:

3. Now, therefore, it is hereby ordered that water may be furnished for the season of 1914 to all lands shown on approved farm-unit plats as applied for on the form hereto attached, which shall be filed in the office of the Reclamation Service at Burley, Idaho, accompanied by payment in full of that portion of the rental charge which accrued, if any, on account of the use during June, July, and August, in 1912 and 1913, of water in excess of 1.75 acre-feet per acre in cultivation, as set forth in order dated March 25, 1913.

4. The minimum rental charge for the irrigation season of 1914 shall be $1.25 per acre of irrigable land, whether or not water is used thereon.

5. For that portion of the season beginning June 1 and ending August 31, 1914, the maximum amount of water which will be furnished for the minimum charge named in paragraph 4 is 1.75 acre-feet per acre of irrigable land actually under cultivation, approximately equal portions of such amount to be delivered during each month of the said period at approximately a uniform rate, so far as practicable, and not in excess of the applicant's proportionate share of the available water supply and capacity of the works: *Provided*,

however, That a rotation system of delivery may be installed to encourage the economical use of water, but in no case shall more water be delivered than is reasonably required for beneficial use.

6. All the water used on any farm unit during June, July, and August, 1914, in excess of 1.75 acre-feet per acre of land actually in cultivation thereon shall be charged for at the rate of 20 cents per acre-foot as measured by the engineers of the Reclamation Service.

7. All charges for 1914, including both the minimum rate and the acre-foot charge for excess supply, shall be due December 1, 1914, and payable to the proper agent of the United States Reclamation Service at Burley, Idaho. No water will be furnished to any farm unit in 1915, or subsequent seasons, until all charges due against such unit shall have been paid.

8. This is a preliminary order made prior to the completion of the project to provide for the rental of water during the season of 1914 only, and is not to be considered as a public notice for South Side pumping unit or any part thereof.

9. The entire rental charges which have heretofore accrued against lands under the South Side pumping unit, whether or not any portion of such charges have been paid, except such amounts as may be due for excess water furnished in 1912 and 1913, shall be added to and incorporated in the building charge to be hereafter announced, and credit for the amount paid for water supplied therefor will be allowed on the building charge on account of each tract: *Provided*, That excess water shall be separately charged against the land on which it is used, and shall be separately collected from the owner or holder thereof.

ANDRIEUS A. JONES,
First Assistant Secretary of the Interior.

ORDER DATED MARCH 31, 1914.

1. Water will be furnished on a rental basis in the irrigation season of 1914 to the lands in the West End extension of the gravity unit of the Minidoka project, Idaho.

2. A list of the lands which may be irrigated, together with the approximate area of each holding that may be watered from the completed works, may be examined at the office of the United States Reclamation Service at Rupert, Idaho. It is expressly understood that such areas are subject to revision for 1915 and subsequent years, after final survey has been made of the irrigable area. The rental charge for the irrigation season of 1914 shall be 75 cents per acre of irrigable land, whether or not water is used thereon.

3. Payment of the rental charge will be due on December 1, 1914, and payable at the office of the Reclamation Service, Rupert, Idaho; and water will not be furnished for such lands in 1915 until full payment of all such amounts due hereunder, as well as for water used in 1913, have been made.

4. No water will be furnished in 1914 to any lands which were served with water in 1913 unless the charges for 1913, due December 1, 1914, shall have been paid in full.

5. Public notice will be hereafter issued announcing the charges, terms, and conditions under which entries and water-right applications may be made for such lands.

ANDRIEUS A. JONES,
First Assistant Secretary.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Minidoka project, to June 30, 1914.

ASSETS.

Cash in other employees' hands awaiting transfer to fiscal agent		$6.37
Accounts receivable:		
Uncollected water rentals	$120,747.15	
Uncollected miscellaneous rentals	24,019.63	
Uncollected miscellaneous items	8,605.34	
Construction charges due and uncollected from water-right applicants	51,142.85	
Operation and maintenance charges due and uncollected from water-right applicants	53,191.99	
Total		257,706.96
Inventories:		
Animals	$6,332.50	
Mechanical and other equipment	42,042.61	
Material and supplies on hand in storehouses	89,303.69	
Goods in transit	3,236.03	
Unadjusted transfers between projects	3,104.78	
Undistributed cost (freight and handling on inventory property)	[1] 41.01	
Total		143,978.60
Construction work in process:		
Gross expenditures for construction of project to date	$4,547,915.68	
Less revenue earned during construction, as follows—		
Rentals of cottages	$3,916.37	
Rentals of grazing lands	904.45	
Rentals of irrigation water	51,937.77	
Miscellaneous revenues	9,171.50	
Profits on hospitals	1,706.94	
Receipts from sale of town sites	140,118.78	
Contractors' freight refunds	552.39	
Forfeitures by defaulting bidders and contractors	45.00	
Adjustments—		
Depreciation on plant and equipment	32,924.39	
Profits shown on Government animals	700.46	
Total deductions	241,978.05	
Net expenditures for construction of project to date		4,305,937.63
Deferred operation and maintenance charges		528,925.98
Total assets		5,236,556.14

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$14,729.90	
Unpaid purchases	5,733.63	
Unpaid contract estimates	15,848.71	
Unpaid freight and express charges	29,941.60	
Unpaid passenger fares	192.45	
Unpaid agreements to purchase real estate	491.50	
Unredeemed meal tickets	1,519.00	
Unpaid miscellaneous	84.37	
Total		$68,541.16

[1] Deduct.

Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		$397,733.78	
Construction charegs paid in advance by water-right applicants		99,754.96	
Construction charges paid and forfeited by water-right applicants		7,214.26	
Total			$504,703.00
Net investment:			
Disbursements	$5,468,222.05		
Transfers received from other projects	274,544.25		
		$5,742,766.30	
Less—			
Collections	884,265.60		
Transfers issued to other projects	195,188.72		
		1,079,454.32	
Total			4,663,311.98
Total liabilities, reserves, and capital investment of the Government			5,236,556.14

Functional feature costs of Minidoka project to June 30, 1914.

Development (storage) works	$1,027,716.77
Carriage system	531,418.05
Distribution system	1,684,855.75
Drainage and flood protection system	22,229.08
Power system	1,060,509.35
Real estate	54,511.33
Telephone lines	31,519.80
Farm-unit subdivisions	3,579.94
Roads and bridges	41,731.23
Miscellaneous preliminary investigations	6,168.97
Operation and maintenance during construction	83,675.41
Gross expenditures for construction of project to date	4,547,915.68

Operating revenues and expenses, Minidoka project, to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$56,480.92
Maintenance	37,861.69
Carriage system:	
Operation	9,056.83
Maintenance	23,642.26
Distribution system:	
Operation	111,129.33
Maintenance	213,336.89
Drainage and flood protection system:	
Operation	8,507.88
Maintenance	582,636.50
Undistributed expenses:	
Operation	68,651.94
Maintenance	35,943.85
Total	1,147,248.09

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$362,087.16
Operation and maintenance charges paid in advance by water-right applicants	1,319.24

Operation and maintenance charges paid and forfeited by water-right applicants		$1,812.08
Rentals of lands and buildings		642.00
Rentals of power and light		39,401.73
Rentals of irrigation water		165,301.08
Miscellaneous revenues		47,758.82
Deferred operation and maintenance revenues (carried to debit side of assets and liabilities statement)		528,925.98
Total		1,147,248.09

Estimated cost of contemplated work, Minidoka project, during fiscal year 1915.

Development (storage) works:		
To complete radial gates in spillway at Minidoka Dam	$250.00	
Contingencies, Jackson Lake Dam	5,000.00	
		$5,250.00
Distribution system:		
Rebuilding sublaterals	23,000.00	
Water-measuring devices	11,640.00	
Works for watering high land	13,100.00	
Enlargement feeders	8,200.00	
Canals, laterals, and structures	27,000.00	
Miscellaneous items	1,100.00	
		84,040.00
Power system:		
Power house and permanent camp	20,000.00	
Pumping stations and permanent camp	30,000.00	
Substations	6,400.00	
Transmission lines	60,000.00	
		116,400.00
Real estate, land purchased around Lake Walcott		7,400.00
Roads and bridges:		
Road along Snake River from Minidoka Dam	$1,500.00	
Bridge across Snake River in Jackson Hole, Wyo	36,000.00	
Bridge across Main North Side Canal near power plant	500.00	
		38,000.00
Operation and maintenance under public notice		180,000.00
Total		431,090.00

Assets, liabilities, reserves, and capital, Jackson Lake enlargement, to June 30, 1914.

ASSETS.

Cash in other employees' hands awaiting transfer to fiscal agent			$962.69
Inventories:			
Mercantile stores stock on hand		$5,290.32	
Animals		2,660.75	
Mechanical and other equipment		40,291.96	
Material and supplies on hand in storehouses		63,380.78	
Unadjusted transfers between projects		4.85	
Undistributed cost (freight and handling on inventory property)		3,789.71	
			115,418.37
Construction work in process:			
Gross expenditures for construction of enlargement to date		122,821.80	
Less revenue earned during construction, as follows—			
Rentals of cottages	$179.90		
Loss on mess house	[1]971.72		
Profits on mercantile stores	629.61		
Loss on hospitals	484.55		
Forfeitures by defaulting bidders and contractors	490.00		

[1] Deduct.

Adjustments—			
Depreciation on plant and equipment	$3,367.80		
Profits shown on Government animals	302.57		
Total deductions		$3,513.61	
Net expenditures for construction of enlargement to date			$119,308.19
Total assets			235,689.25

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$7,418.82	
Unpaid purchases		9,307.57	
Unpaid freight and express charges		9,068.44	
Unpaid passenger fares		300.50	
Unredeemed coupon books		19.60	
Unredeemed meal tickets		4.25	
Total			26,119.18
Reserves for repayment to reclamation fund of cost of enlargement:			
Construction charges paid by Kuhn Irrigation & Canal Co		$290,925.83	
Construction charges paid by Twin Falls Canal Co		105,341.02	
Total			396,266.85
Net investment:			
Disbursements	$143,103.06		
Transfers received from projects	72,567.15		
		$215,670.21	
Less—			
Collections	401,902.43		
Transfers issued to projects	464.56		
		402,366.99	
Total			186,696.78
Total liabilities, reserves, and capital investment of the Government			235,689.25

Functional feature costs of Jackson Lake enlargement to June 30, 1914.

Development (storage) works (gross building expenses to date)	$122,821.80

Estimated cost of contemplated work, Jackson Lake enlargement, during fiscal year 1915.

Development (storage) works:	
Roads	$500.00
Buildings	4,000.00
Telephone	500.00
Real estate	20,000.00
Headworks	195,000.00
Dike	80,000.00
Total	300,000.00

[1] Deduct.

KANSAS, GARDEN CITY PROJECT.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Finney and Kearney.
Townships: 23 and 24 S., Rs. 32 to 34 W., sixth principal meridian.
Railroad: Atchison, Topeka & Santa Fe.
Railroad stations and estimated population January 1, 1914: Garden City, 3,500; and Deerfield, 200.

WATER SUPPLY.

Source of water supply: Shallow wells near Arkansas River, and natural flow from the river.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: No water being supplied by Reclamation Service, on account of failure of water users to pay back charges.
Length of irrigating season: From April 1 to October 31—214 days.
Average elevation of irrigable area: 2,925 feet above sea level.
Average annual rainfall on irrigable area: 19 inches; 1913, 19.74 inches.
Range of temperature on irrigable area: —20° to 105° F.
Character of soil of irrigable area: Fertile black sandy loam.
Principal products: Alfalfa, sugar beets, melons, sweet potatoes, small fruits.
Principal markets: Garden City, Kans.; Kansas City, Mo.; Chicago, Ill.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: March 6, 1908, and November 30, 1908.
Location of lands opened: Tps. 23 and 24 S., Rs. 32, 33, and 34 W., sixth principal meridian.
Irrigable lands opened: 10,677 acres, all in private ownership.
Limit of area of farm units: 160 acres.
Duty of water: 2 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $37.50.
Annual operation and maintenance charge: $2.75 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1904.
Construction recommended by board of engineers September 5, 1905.
Construction authorized by Secretary October 5, 1905.
Power plant completed July, 1907.
Conduit and siphon completed July, 1907.
First irrigation by Reclamation Service, season of 1908.
Wells completed, April, 1908.
Pumps: 10 installed in 1907, 13 installed in 1908.
Entire project 98 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Garden City project provides for the utilization by pumping of the underground flow of the Arkansas River Valley to supplement the normal flow of Arkansas River distributed through the Farmers ditch to irrigate lands northwest of Garden City, Kans.

A powerhouse is located on the main line of the Atchison, Topeka & Santa Fe Railroad at Deerfield, Kans., and electrical energy is transmitted to 23 pumping stations, located along a concrete-lined canal 20,000 feet in length.

The pumps are connected at three of these stations to 12 15-inch wells each, and at 20 stations to 9 wells each. All of the features of this plan are completed.

OPERATION AND MAINTENANCE.

Payment of the Reclamation Service charges has not been made since 1909, and inasmuch as the public notices which have been issued provide that no water shall be furnished in any irrigation season until the operation and maintenance charges of the previous season have been paid, the plant at Garden City has been closed, and future operations will depend upon the action of the settlers. The plant itself is not a failure, but the people will not try to make it a success. Since 1909 no water has been pumped, and maintenance work has been confined to the necessary care of the plant.

A fire occurred on November 2, 1913, destroying the two-story workshop in which were stored several motors belonging to the pumping stations.

FUTURE OPERATIONS OF PLANT.

Senate bill 6784, permitting the sale of the pumps and other equipment and a release of a lien on the lands of the intended water users, failed to pass the House of Representatives, the result being that the landowners have applied to the courts for the desired relief.

The supervisor of irrigation plans in the near future to make a trip to the project to ascertain the attitude and views of the water users and devise, if possible, some method of reviving the operations of the pumping plant. Consideration is also being given to a proposition to utilize the plant as a central power plant to transmit electricity to the farms in the vicinity to operate individual pumping plants.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Garden City project, to June 30, 1914.

ASSETS.

Inventories:			
Mechanical and other equipment		$2,951.88	
Material and supplies on hand in storehouses		1,922.19	
Unadjusted transfers between projects		125.00	
			$4,999.07
Construction work in process:			
Gross expenditures for construction of project to date		384,536.26	
Less revenues earned during construction as follows:			
Rentals of cottages	$619.58		
Miscellaneous revenues	13.00		
Profits on mess houses	860.82		
Profits on hospitals	585.58		
Contractors' freight refunds	1,911.73		
Forfeitures by defaulting bidders and contractors	5,800.00		
Total deductions		9,790.71	
Net expenditures for construction of project to date			374,745.55
Total assets			379,744.62

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid contract holdbacks	$3,711.86	
Unpaid passenger fares	3.60	
		$3,715.46

Net investment:			
Disbursements	$379,899.52		
Transfers received from other projects	11,546.95		
		391,446.47	
Less—			
Collections	4,788.73		
Transfers issued to other projects	10,628.58		
		15,417.31	
Total			376,029.16
Total liabilities, reserves, and capital investment of the Government			379,744.62

Functional feature cost of Garden City project to June 30, 1914.

Development works	$105,081.64
Carriage system	89,960.40
Power system	123,996.30
Real estate	5,587.46
Farm-unit subdivisions	285.66
Miscellaneous preliminary investigations	7,618.72
Operation and maintenance during construction	52,006.08
Gross expenditures for construction of project to date	384,536.26

Estimated cost of contemplated work, Garden City project, during fiscal year 1915.

Operation and maintenance during construction	$600

MONTANA, BLACKFEET (INDIAN) PROJECT.

C. J. Moody, project manager, Browning, Mont.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

County: Teton.

Townships: 31 to 34 N., Rs. 5 to 10 W.; 29 N., R. 8 W.; 30 N., Rs. 6 to 9 W.; and 35 N., Rs. 6 and 7 W., Montana meridian.

Railroad: Great Northern.

Railroad stations and estimated population, January 1, 1914: Browning, 250; Blackfoot, 50; Bombay; Seville; Garnet; Glacier Park, 100; and Cut Bank, 800.

WATER SUPPLY.

Source of water supply: Cut Bank, Two Medicine, Badger, Birch, Whitetail, and Blacktail Creeks.

Area of drainage basins: 1,700 square miles.

Annual run-off in acre-feet: Cut Bank Creek at Cut Bank (971 square miles), 1906 to 1913, maximum, 269,000; minimum, 100,210; mean, 181,801. Two Medicine Creek at Family (368 square miles), 1907 to 1913, mean, 327,130. Badger Creek at Family (224 square miles), 1907 to 1913, mean, 180,000. Birch Creek at Dupuyer (155 square miles), 1907 to 1913, mean, 115,560.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to furnish water, season of 1914: 26,649 acres.

Area under water-right applications, season of 1914: 760 acres.

Area irrigated season of 1914: About 400 acres to June 30.

Length of irrigating season: May 1 to September 30; 153 days.

Average elevation of irrigable area: 3,850 feet above sea level.

Average annual rainfall on irrigable area: 1909–1913, 13.08 inches; 1913, 13.17 inches.

Range of temperature on irrigable area: —44° to 100° F.

Character of soil of irrigable area: Principally rich sandy loam; some gravelly loam and gumbo.

Principal products: Hay, grain, and vegetables.

Principal markets: Great Northern Railway towns from St. Paul to the Pacific coast. Local demand for hay for stock feeding.

LANDS OPENED TO IRRIGATION.

No lands have been opened to irrigation by public notice. All lands covered by canals are allotted to Indians.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys made in 1907.
Construction work on the Two Medicine unit begun in July, 1908.
Construction of Two Medicine Lake Dam begun in July, 1911.
Construction of Badger-Fisher unit begun in June, 1911.
Two Medicine unit 73 per cent completed, June 30, 1914.
Badger-Fisher unit 60 per cent completed, June 30, 1914.
Entire project 31 per cent completed, June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Blackfeet project provides for five irrigation systems on the Blackfeet Indian Reservation, as follows: (1) The Carlow Canal system, heading on the right bank of Cut Bank Creek and supplying water for 18,000 acres of land near Carlow and Seville stations on the Great Northern Railway; (2) the Cut Bank Canal system, heading on the left bank of Cut Bank Creek and supplying water for 20,000 acres of land north and east of the creek, 11,000 acres of which are outside the reservation; (3) the Two Medicine Canal system, diverting from the left bank of Two Medicine River and supplying water through the North Branch Canal, the Spring Lake Reservoir, and South Branch Canal to 48,000 acres of land; (4) the Badger Canal system, diverting water from the right bank of Badger Creek, supplying water direct through a feeder canal to 3,000 acres of land on Piegan Flats and through Four Horns Supply Canal and Reservoir to 33,000 acres of land between Badger and Birch Creeks; and (5) the Birch Creek Canal system, diverting from Birch Creek, and supplying water to 3,500 acres of land between Birch and Blacktail Creeks. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The irrigable lands of the project are located in general in the southeastern portion of the Blackfeet Indian Reservation, between Cut Bank and Birch creeks. Of the above irrigation plan the first development of the Two Medicine Canal system has been completed, including 36 miles of main canal, with headworks and other structures and a complete distributing system, with structures, to deliver water to approximately 24,000 acres of land. On the Badger unit a small canal diverts water from Badger Creek direct to approximately 3,000 acres of Piegan Flats. A supply canal 12 miles long is completed, except for a structure at the crossing of Whitetail Creek, which will divert the water of Badger Creek into Four Horns Reservoir, where storage will be available by proposed construction of dam and controlling works. Water from this storage will follow a natural channel of Blacktail Creek, from which it is diverted into Fisher Canal, designed to irrigate approximately 30,000 acres on Fisher Flats. The Fisher main canal is completed both as to excavation and structures to the end at mile 30. Excavation of the main laterals under this system is 75 per cent completed and of the sublaterals 10 per cent. Two large chute drops on lateral K have been completed. Construction work of the immediate future includes the completion of the excavation and structures for the Fisher Canal distributaries; construction of the Whitetail Creek crossing for the Four Horns supply canal; excavation of the outlet of Four Horns Reservoir and resurvey of all reservoir sites. The Carlow, Cut Bank, and Birch units remain to be constructed upon the completion of the Two Medicine and Badger units.

CONSTRUCTION DURING FISCAL YEAR.

Two Medicine unit.—The Two Medicine Dam embankment and paving were completed.

Badger unit.—Excavation of Fisher Canal was completed and about 16 miles of laterals of the Fisher system. Two chute concrete drops of 185 second-feet capacity on lateral K of the Fisher Canal system have been constructed.

SURVEYS.

Location of sublaterals has been made on the Badger unit. Preliminary location has been made for a canal between Middle Two Medicine Lake and Willow Creek for the Carlow and Cut Bank units.

OPERATION AND MAINTENANCE.

No water was delivered to land in 1913, since there were no requests for it. The Two Medicine Canal was placed in condition for irrigation and is now being operated for about 1,000 acres of Indian land.

Historical review, Blackfeet project.

Item.	1909	1910	1911	1912	1913	1914[1]
Acreage for which service was prepared to supply water			20,000	24,000	26,649	26,649
Acreage irrigated			0	0	0	500
Miles of canals operated			0	25		
Water diverted (acre-feet)				3,650	700	7,000
Water delivered to land (acre-feet)				41	0	1,000
Per acre of land irrigated (acre-feet)						1

[1] Estimated.

SETTLEMENT.

Land under the project has not been opened for settlement; 46,000 acres have been allotted to Indians, but have not yet been settled upon by them or farmed.

Settlement data, Blackfeet project.

Item.	1912	1913	1914
1. Total number of farms on project	3,000	3,000	3,000
2. Population of (1)	(1)	(1)	(1)
3. Number of irrigated farms	0	0	12
4. Operated by owners or managers	0	0	12
5. Operated by tenants			
6. Population of (3)			40
7. Number of towns	4	4	4
8. Population of (7)	300	300	300
9. Total population in towns and on farms, sum of (2) and (8)	340	340	340
10. Number of public schools	1	1	1
11. Number of churches	2	2	2
12. Number of banks	0	0	0

[1] Not opened.

PRINCIPAL CROPS.

The principal crops will be hay, grain, and vegetables. None of the irrigable area was farmed in 1913. In 1914 the principal crops planted on the irrigable lands are oats and hay, with small areas of vegetables. Agricultural conditions in 1914 are good for irrigated land and poor for dry farming. All crops are late on account of cold weather in the early part of the season.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Blackfeet project, to June 30, 1914.

ASSETS.

Cash in fiscal agents' possession awaiting remittance		$56.10
Accounts receivable:		
Uncollected freight refunds	$10.67	
Uncollected miscellaneous items	28,655.73	
Total		28,666.40

Inventories:			
Mercantile stores, stock on hand		$3,972.71	
Animals		12,428.19	
Mechanical and other equipment		11,859.61	
Materials and supplies on hand in storehouses		5,564.51	
Goods in transit		35.40	
Unadjusted transfers between projects		[1] 4,696.42	
Undistributed cost (freight and handling on inventory property)		2,380.27	
Total			$31,544.27
Construction work in process:			
Gross expenditures for construction of project to date		$895,716.59	
Less revenue earned during construction, as follows—			
Rentals of cottages	$420.19		
Rentals of telephones	594.60		
Profits on mess houses	8,965.30		
Profits on mercantile stores	20,098.05		
Profits on hospitals	204.04		
Profits on blacksmith shops	310.48		
Loss shown on Government animals	[1] 811.55		
Total deductions		29,781.11	
Net expenditures for construction of project to date			865,935.48
Total assets			926,202.25

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$3,379.02	
Unpaid purchases		1,425.74	
Unpaid freight and express charges		1,716.10	
Unpaid passenger fares		80.93	
Unredeemed coupon books		199.50	
Unredeemed meal tickets		4.75	
Total			6,806.04
Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contract with Indian Service			856,355.23
Net investment:			
Disbursements	$882,098.18		
Transfers received from other projects	94,932.01		
		$977,030.19	
Less—			
Collections	849,101.95		
Transfers issued to other projects	64,887.26		
		913,989.21	
Total			63,040.98
Total liabilities, reserves, and capital investment of the Government			926,202.25

Functional feature costs of Blackfeet project to June 30, 1914.

Development (storage) works	$147,213.82
Carriage system	598,801.83
Distribution system	107,453.21

[1] Deduct.

Telephone lines	$8,279.58
Roads and bridges	6,634.35
Miscellaneous preliminary investigations	8,641.62
Operation and maintenance during construction	18,037.26
Cost ledger inventories	654.92
Gross expenditures for construction of project to date	895,716.59

Estimated cost of contemplated work, Blackfeet project, during fiscal year 1915.

Carriage system:		
Whitehall crossing, wood stavepipe siphon—		
Excavation	$123.17	
Back fill	560.00	
Concrete, 44 cubic yards	794.70	
Wood stavepipe, 1,050 linear feet	5,250.00	
Engineering and contingencies	1,058.69	
		$7,786.56
Distribution system:		
Four Horns controlling works—		
Excavation of 16,000 cubic yards, at 65 cents (material to be placed in dam section)	10,400.00	
Fisher Canal station 1534—		
Drop and turnouts	4,710.00	
Lateral K 186—		
Drops and turnouts	3,697.00	
Lateral M station 94–104—		
2 drops	3,825.00	
7 wooden bridges	1,450.00	
Fisher distribution system—		
Excavation of sublaterals with go-devil, 60,000 cubic yards, at 12 cents	7,200.00	
Excavation of laterals with teams, 30,000 cubic yards, at 22 cents	6,600.00	
Engineering and contingencies	4,331.44	
		42,213.44
Total		50,000.00

MONTANA, FLATHEAD (INDIAN) PROJECT.

E. F. Tabor, project manager, St. Ignatius, Mont.; S. G. Swigart, irrigation manager.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Flathead, Missoula, Sanders.
Townships: 15 to 25 N., Rs. 17 to 25 W., Montana meridian.
Railroad: Northern Pacific.
Towns and estimated population, January 1, 1914: Evaro, 39; Arlee, 100; Ravalli, 75; Dixon, 175; Perma, 50; Camas, 250; Dayton, 145; Big Arm, 83; Polson, 1,300; St. Ignatius, 200; and Ronan, 400.

WATER SUPPLY.

Source of water supply: Flathead, Jocko, and Little Bitter Root rivers; Mud, Crow, Post, Mission, Dry, Finley, Agency, Big Knife, and Valley creeks, and about 60 smaller streams.
Area of drainage basin: 8,000 square miles.
Annual run-off in acre-feet of Flathead River at Polson, 1908 to 1913: Maximum, 9,740,000; minimum, 7,455,000; mean, 8,534,800.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: 48,400 acres.
Area under water-rental applications, season of 1914: 13,996 acres.
Length of irrigating season: May 1 to September 30—153 days.
Average elevation of irrigable area: 3,000 feet above sea level.
Average annual rainfall on irrigable area: At St. Ignatius, Mont., station, 1909 to 1913, 16.4 inches; 1913, 17 inches. Probably less on average irrigable area.
Range of temperature on irrigable area: —30° to 96° F.
Character of soil of irrigable area: Varies from light sandy loam to heavy clay.
Principal products: Grain, hay, vegetables, fruit, and cattle.
Principal markets: Missoula, Butte, and Anaconda, Mont., and other mining and lumber towns and camps.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: Proclamation of the President, May 22, 1909, opened lands to filing under certain rules as to registration, etc., first filing to be May 2, 1910.
Location of lands opened: Tps. 17 to 24 N., Rs. 19 to 24 W., Montana meridian.
Present status of irrigable area opened: About 49,000 acres have been entered; 1,000 acres open to entry; 97,000 acres in private ownership, mostly Indian allotments held under trust patents; 5,000 acres of State lands.
Limit of area of farm units: 160 acres. Average irrigable, about 40 acres.
Duty of water: Works will provide about 1.5 acre-feet per acre per annum at the farm.
Building charges: Not fixed.
Annual operation and maintenance charges: $1 per acre-foot; minimum charge, $1 per acre, 1914.

Reconnoissance and preliminary surveys begun in 1907.
Construction authorized and first appropriation made by act of Congress approved April 30, 1908.
Irrigation begun in Jocko and Mission divisions in 1910.
Irrigation in Post division begun in 1911.
Kickinghorse Feeder Canal completed in 1912.
Irrigation in Polson and Pablo divisions begun in 1913.
Entire project 20.7 per cent completed, June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Flathead project provides for the irrigation of about 152,000 acres of land in various parts of what was the Flathead Indian Reservation, water being diverted from creeks and rivers rising in the Mission Mountains and conducted by canals directly to the land and to reservoirs for the storage of flood water. About 12 reservoirs will be constructed. Some of these are lakes, the capacity of which will increase, and others natural basins, which will require only the building of embankments at low points. The water supply will be supplemented when necessary by pumping from Flathead Lake. Irrigable tracts on the Jocko, Mission, Post, Pablo, and Polson divisions, which contain the largest percentage of irrigable land allotted to the Indians, have been selected for the first development. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The following principal features have been completed: A distribution system covering approximately 5,000 acres of land north of the Jocko River, taking water from the Jocko River; a distribution system covering 6,000 acres on the south side of Jocko River, using the Finley, Agency, and Big Knife Creeks and Jocko River as water supply; Mission lateral B, covering approximately 5,000 acres of land between Mission and Post Creeks; a distribution system covering 16,000 acres of land lying under the Ninepipe Reservoir; the Pablo feeder canal from Post Creek to North Pablo Reservoir; a distribution system covering about 2,000 acres lying under Kickinghorse Reservoir; a distribution system covering about 8,000 acres lying under the Pablo Reservoirs; a distribution system covering about 1,000 acres lying under the Pablo feeder canal on the Polson Slope; a canal system (except structures) covering 3,000 acres for lands under Pablo Reservoirs in Valley View district; and a canal system (except metal portion of flumes) for irrigation of 2,000 acres in Moiese Valley. Pablo Dams have been completed to hold about 5,000 acre-feet and Ninepipe Dam to hold about 5,000 acre-feet.

CONSTRUCTION DURING FISCAL YEAR.

Pablo division.—Contract work on South Pablo Dam was completed early in the fiscal year to store about 5,000 acre-feet when paved. Four thousand four hundred square yards of paving were placed during the winter months by Government forces to store about 2,000 acre-feet at present. Government forces also constructed two large paved inclined drops and completed the principal turnouts and small drops needed for about 8,000 acres under Pablo lateral A. Contract work was started and completed on earthwork only for about 3,000 acres southwest of Pablo Reservoirs, and these works when extended by sublaterals will reach about 7,000 acres additional. Under the same contract work is under way extending the Pablo lateral A to reach 2,000 acres now, and by extensions about 10,000 acres additional later. Contract work was begun and nearly completed on a tunnel 441 feet long to conduct water from constructed canals to the canal system completed as above.

Post division.—Work was begun by Government forces on Crow Creek, taking water for the Moiese Valley to reach 2,000 acres now, and by extensions about 2,000 more in the future. This system was completed at the end of the fiscal year except for placing two metal flumes under contract. The flumes form part of the main line, carrying 115 second-feet, and the system will probably be in use by the latter part of July, 1914.

Additional farm turnouts and measuring devices were built in all parts of the project as the needs of the irrigators required.

OPERATION AND MAINTENANCE.

During the calendar year 1913, 197 water rental applications were received, but owing to a comparatively rainy spring only 155 farmers actually irrigated. The total irrigable area of the 197 farms making application was 13,892 acres and of the 155 farms irrigated, 11,371 acres. The area actually irrigated was 4,631 acres, and the total amount of water delivered was 6,014 acre-feet, or 1.3 acre-feet per acre, a reduction of 0.68 acre-foot per acre from the previous season. The rotation system of delivery was continued with satisfactory results, one of which is the reduction in water used per acre. To June 30, 1914, 212 applications for water were received, representing 13,996 acres. Up to June 20, 1914, 112 farms used 1,502 acre-feet of water on 2,020 acres.

Historical review, Flathead project.

Item.	1910	1911	1912	1913	1914
Acreage for which service was prepared to supply water	10,000	19,000	32,000	42,400	48,400
Acreage irrigated	2,191	2,369	4,203	4,631	6,416
Miles of canal operated		46	103	180	233
Water diverted (acre-feet)	18,857	10,940	21,875	22,945	24,523
Water delivered to the land (acre-feet)	9,936	4,719	8,344	6,014	8,752
Per acre of land irrigated (acre-feet)	4.53	1.99	1.98	1.30	1.36

SETTLEMENT.

Settlement of that portion of the project under irrigation works is increasing and such farms as are changing hands are being purchased by a more industrious and better class of farmers. Homestead entrymen in the "dry" section are commuting and vacating the lands, either leasing the lands or letting them remain idle. Approximately 1,000 acres have been taken up by homestead entry since January, 1913. On May 21, 1914, 67 Indian allotments were offered at public sale, of which but 8 were sold. A farmers' association, known as the Farmers' Society of Equity, has been organized, with branches at St. Ignatius, Moiese Valley, Ronan, and Dixon, for the purpose of economic and social advancement of the settlers of the project. The present membership of the organization is about 100.

Settlement data, Flathead project.

Item.	1912	1913	1914
1. Total number of farms on project (irrigable)	2,980	2,980	2,980
2. Population of (1)	[1] 8,000	8,400	13,855
3. Number of irrigated farms	111	155	212
4. Operated by owners or managers	84	127	182
5. Operated by tenants	27	28	30
6. Population of (3)	([2])	([2])	997
7. Number of towns	10	10	10
8. Population of (7)	([2])	([2])	2,842
9. Total population in towns and on farms	([2])	([2])	16,697
10. Number of public schools	.....	.....	36
11. Number of churches	.....	.....	14
12. Number of banks	.....	.....	9
13. Total capital stock	.....	.....	$205,000
14. Total amount of deposits	.....	.....	$535,870
15. Total number of depositors	.....	.....	2,614
16. Number of relinquishments	([3])	([3])	([3])
17. Number of cancellations	([3])	([3])	([3])

[1] Includes both irrigated and "dry" farms on the project.
[2] Included in (1).
[3] Information not available.

PRINCIPAL CROPS.

There was a good increase of forage and hay crops in 1913, which were all consumed on the farms, and there is a much larger increase of such crops this season. This is a most satisfactory sign of the tendency to diversified farming, stock raising, and feeding. This is also indicated in the stock returns, which show an increase of $185 per farm in value of stock of all kinds.

Crop report, Flathead project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa hay	53	Ton	89.9	1.7	$10.00	$899	$17.00
Barley	122	Bushel	1,953.0	16.0	.56	1,094	8.96
Beans	1	.....	([1])	.....	.....	.....	.....
Clover hay	147	Ton	207.9	1.4	10.00	2,079	14.00
Corn	3	Bushel	156.0	62.0	.60	94	37.20
Corn fodder	6	Ton	49.0	8.0	5.00	245	40.00
Flax	3	Bushel	24.0	8.0	1.12	27	8.96
Garden	35	.....	.....	.....	.....	1,768	50.00
Hay, except above	266	Ton	212.3	.8	12.00	2,548	9.60
Millet seed	2	Bushel	33.0	18.0	1.50	50	27.00
Oats	2,552	do	95,929.0	38.0	.30	28,779	11.40
Orchard (apples)	2	Pound	6,500.0	4,060.0	.02	130	81.20
Pasture	106	.....	.....	.....	.....	793	7.50
Peas	6	Bushel	43.0	8.0	2.50	108	20.00
Potatoes	49	do	4,234.0	86.0	.60	2,540	51.60
Rape	1	Ton	2.0	2.0	4.00	8	8.00
Sugar beets	1	do	5.0	5.0	5.00	25	25.00
Wheat	1,225	Bushel	19,475.0	16.0	.65	12,659	10.40
Total	4,579	.....	.....	.....	.....	53,846	11.76
Irrigated, no crop:							
Young alfalfa	20	.....	.....	.....	.....	.....	.....
Young orchard	32	.....	.....	.....	.....	.....	.....
Total	52	.....	.....	.....	.....	.....	.....
Total irrigated	4,631	.....	.....	.....	.....	.....	.....

Crop report, Flathead project, year of 1913—Continued.

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	11,371	155
Total irrigated area farms reported	4,631	155
Under rental contracts	4,631	155
Total area cropped under irrigation on farms reported	4,579	155

[1] Failure.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Flathead project, to June 30, 1914.

ASSETS.

Cash in other employees' hands awaiting transfer to fiscal agent		$22.35
Accounts receivable:		
Uncollected water rentals	$6,764.90	
Uncollected miscellaneous rentals	68.20	
Uncollected miscellaneous items	48,157.45	
Total		54,990.55
Inventories:		
Mercantile stores, stock on hand	1,568.66	
Animals	21,184.52	
Mechanical and other equipment	37,452.92	
Material and supplies on hand in storehouses	40,378.08	
Undistributed cost (freight and handling on inventory property)	713.36	
Total		101,297.54
Construction work in process:		
Gross expenditures for construction of project to date	$1,385,879.17	
Less revenue earned during construction, as follows—		
Rentals of cottages	$1,653.04	
Rentals of irrigation water	17,518.50	
Rentals of telephones	3,388.16	
Miscellaneous revenues	310.31	
Profits on mess houses	15,379.97	
Profits on mercantile stores	8,525.50	
Profits on hospitals	1,780.01	
Contractors' freight refunds	1,236.49	
Adjustments—		
Depreciation on plant and equipment	3,570.05	
Profits shown on Government animals	11,526.63	
Total deductions	64,888.66	
Net expenditures for construction of project to date		1,320,990.51
Total assets		1,477,300.95

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$4,977.49	
Unpaid purchases	1,998.09	
Unpaid contract estimates	10,246.50	
Unpaid contract holdbacks	2,662.89	
Unpaid freight and express charges	4,157.02	
Unpaid passenger fares	12.00	
Total		24,053.99

Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contract with Indian Service			$1,317,368.26
Net investment:			
Disbursements	$1,385,907.76		
Transfers received from other projects	78,835.85		
		$1,464,743.61	
Less—			
Collections	1,305,152.34		
Transfers issued to other projects	23,712.57		
		1,328,864.91	
Total			135,878.70
Total liabilities, reserves, and capital investment of the Government			1,477,300.95

Functional feature costs of Flathead project to June 30, 1914.

Development (storage) works	$530,692.89
Distribution system	478,083.91
Power system	95,553.15
Telephone lines	9,162.59
Farm unit subdivisions	6,692.06
Roads and bridges	24,704.83
Miscellaneous preliminary investigations	197,927.11
Operation and maintenance during construction	42,073.34
Cost ledger inventories	989.29
Gross expenditures for construction of project to date	1,385,879.17

Estimated cost of contemplated work, Flathead project, during fiscal year 1915.

Development (storage) works:		
Pablo storage feeder canal	$4,000.00	
Survey and design	18,000.00	
Stream gaging	2,000.00	
		$24,000.00
Distribution system:		
Pablo canals	151,500.00	
Post canals	2,500.00	
Jocko canals	600.00	
Mission canals	1,262.10	
Polson canals	137.90	
		156,000.00
Operation and maintenance during construction		20,000.00
Total		200,000.00

MONTANA, FORT PECK (INDIAN) PROJECT.

R. M. Conner, Project Manager, Poplar, Mont.

(For *Results to June 30, 1914*, and *Data for complete projects*, see appendix.)

LOCATION.

Counties: Valley, Sheridan.
Townships: 26 to 33 N., Rs. 39 to 56 E., Montana meridian.
Railroad: Great Northern.
Railroad stations and estimated population January 1, 1914: Wiota;[1] Kintyre;[1] Frazer, 30; Oswego, 60; Lohmiller;[1] Wolf Point, 400; Chelsea;[1] Poplar, 800; Sprole;[1] Brockton, 100; Calais,[1] and Blair.[1]

WATER SUPPLY.

Source of water supply: Missouri and Poplar rivers; Big Porcupine, Little Porcupine, Wolf, Smoke, and Big Muddy creeks.
Area of drainage basins: Missouri River, 85,000 square miles; Poplar River, 3,000 square miles.
Annual run-off in acre-feet (1909 to 1913): Poplar River, mean, 69,600; Big Porcupine Creek at Nashua, mean, 17,200; Little Porcupine Creek near Frazer, mean, 6,300; Wolf Creek at Wolf Point, mean, 5,600; Big Muddy Creek near Culbertson, mean, 22,300.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1914: Little Porcupine unit, 2,330 acres; Poplar River unit, 7,890 acres.
Area irrigated, season of 1914: 800 acres to June 30, 1914.
Length of irrigating season: From April 1 to August 15, 137 days.
Average elevation of irrigable area: 2,000 feet above sea level.
Average annual rainfall on irrigable area: 1896 to 1913, 14.28 inches; 1913, 11.76 inches. Dry year.
Range of temperature on irrigable area: —40° to 100° F.
Character of soil of irrigable area: Heavy clay and loam.
Principal products: Hay, grain, and vegetables.
Principal market: Local.

LAND OPENED FOR IRRIGATION.

In the construction of the systems laterals are being constructed to the allotted areas only. The work of allotting has been practically completed, but a few changes are being made. The area allotted in each unit is as follows: Big Porcupine, 6,400 acres; Little Porcupine, 2,330 acres; Missouri River gravity, 38,000 acres; Poplar River, 11,600 acres; and Big Muddy, 12,900 acres.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys made in 1908.
Little Porcupine unit completed to allotted irrigable area in July, 1911.
Construction work on project discontinued temporarily July 31, 1911, and resumed October 10, 1912.
Entire project 7½ per cent completed June 30, 1914.

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[1] Population less than 25.

IRRIGATION PLAN.

The irrigation plan of the Fort Peck project provides, in so far as the water supply is found sufficient, for the irrigation of lands in various parts of the Fort Peck Indian Reservation and adjacent territory as follows: (1) 4,000 acres in the vicinity of Wiota station, with flood-water supply from the Big Porcupine Creek; (2) 2,000 acres in the vicinity of Frazer, with water supply from Little Porcupine Creek, conserved by storage; (3) 28,000 acres in the vicinity of Poplar and extending along Poplar River a distance of about 35 miles, with water supply from Poplar River, conserved by storage below the forks of Poplar River and West Branch; (4) 16,000 acres lying along the west side of Big Muddy Creek, with water supply from Big Muddy Creek, conserved by storage on Smoke and Wolf Creeks; (5) 50,000 acres of clear bench land and approximately 34,000 acres of brush and timber land extending along the Missouri River, with water supply from the Missouri River by a gravity canal heading near the site of old Fort Peck; (6) 10,000 acres known as the Galpin Bottom, lying above the Missouri River Canal west of Milk River and the Fort Peck Indian Reservation, with water supply by pumping from the Missouri River Gravity Canal, with a lift of about 20 feet; (7) 8,000 acres lying above the Missouri River Canal, east of Milk River, in the Fort Peck Indian Reservation, with water supply by pumping from the Missouri River Gravity Canal, with a lift of from 10 to 20 feet. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The Little Porcupine unit, with storage reservoir of 3,900 acre-feet, has been completed to irrigate 2,330 acres. Poplar River West Canal "B" has been completed to irrigate 2,560 acres of allotted area, and Poplar River East Canal "C" to irrigate 5,330 acres of allotted land is 95 per cent completed.

It is proposed next to construct the Big Muddy unit on the east boundary of the reservation, to irrigate 12,920 acres of allotted land, and provide necessary storage for this unit and for Poplar River and Big Porcupine units. The construction of the Missouri River Canal to irrigate 37,900 acres of allotted land should be begun at an early date.

CONSTRUCTION DURING FISCAL YEAR.

The work performed on the Fort Peck project to date has been on the construction of units irrigated from the small streams of the reservation. The canals and laterals have been constructed to irrigate only the allotted areas under the Little Porcupine unit and the Poplar River East and West Canals. Poplar River West Canal B was extended in the fall of 1913 to furnish 40 second-feet of water to the Agency Ditch to avoid the yearly construction of a brush dam and reconstruction of head gates. Work began in October, 1913, on the construction of the Big Porcupine unit with a main canal of 100 second-feet capacity, to irrigate 4,000 acres of very desirable allotted land near Wiota. The excavation of the main canal has been completed and work begun on the laterals. The last 12 miles of Poplar River East Canal C have been excavated and bridges and lateral turnouts from the main canal installed. Work is in progress on the construction of farm turnouts, checks, and drops, and this work was 30 per cent completed on June 30, 1914.

OPERATION AND MAINTENANCE.

The Little Porcupine unit and Poplar River West Canal B were operated during the season of 1913, but owing to the very wet year in 1912 it was difficult to persuade the Indian allottees to use water. A small amount was used, however, as an object lesson. Good progress was being made in 1914 up to the 1st of June, when an ex-

ceptional rainfall of over 5 inches, extending over 10 days, temporarily discouraged irrigation. Water has been delivered on the Little Porcupine unit throughout the month of May and early June for the irrigation of hay meadows and a small acreage of grain.

Historical review, Fort Peck project.

Item.	1913	1914[1]
Acreage for which service was prepared to supply water	4,970	10,220
Acreage irrigated	410	800
Miles of canal operated	30	85
Water diverted (acre-feet)	800	2,000
Water delivered to land (acre-feet)	800	2,000
Per acre of land irrigated (acre-feet)	1.9	1.5

[1] Estimated.

SETTLEMENT.

During the past year the grazing land on the Fort Peck Reservation has been opened to settlement through a drawing in September, 1913, and filings in May and June, 1914. About 30,000 acres had been entered up to June 30. Sixty-three per cent of the irrigable land within the reservation has been allotted to Indians, and a small percentage of these live on their allotments.

Settlement data, Fort Peck project.

Item.	1913	1914
1. Total number of allotments on project		1,780
2. Population[1]	1,991	1,991
3. Number of irrigated farms	18	[1] 25
4. Operated by owners or managers	18	22
5. Operated by tenants		3
6. Population of irrigated farms	[1] 50	[1] 70
7. Number of towns	5	5
8. Population of towns, white	980	1,440
9. Total population in towns and on farms	2,971	3,431
10. Number of schools:		
Indian	5	5
White	1	2
11. Number of churches	5	6
12. Number of banks	3	4
13. Total capital stock	$65,000	$85,000
14. Total amount of deposits	$160,000	$223,300
15. Total number of depositors	900	1,250

[1] Estimated.

PRINCIPAL CROPS.

The principal crops raised on the reservation are oats, wheat, flax, and vegetables and a large tonnage of bluejoint hay. The crops of 410 acres were valued at $1,960. On dry land the crops were small and scattering. There is an increase of acreage this year over 1913, both on irrigated and unirrigated land. The greater part of the land farmed by the Indians lies under the Missouri River Canal, the construction of which has not been undertaken. Over 8 inches of rain fell during June and the outlook for a large crop is exceptionally good, even without irrigation. This rainfall is over two and one-half times the normal for the month of June for the past 19 years.

Crop report, Fort Peck project, year of 1913.

Crop.	Area acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Hay	360	Ton	360	1	$4.50	$1,620	$4.50
Grain	20	Bushel	300	15	.60	180	9.00
Flax	20	do	160	8+	1.00	160	8.00
Gardens	10						
Total irrigated and cropped	410						
Total and average						1,960	4.78

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	1,160	28
Total irrigated area farms reported	410	28
Total cropped area farms reported	410	28

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Fort Peck project, to June 30, 1914.

ASSETS.

Cash in fiscal agent's possession awaiting remittance		$193.49
Accounts receivable, uncollected miscellaneous items		47,293.33
Inventories:		
Mercantile stores, stock on hand	$7,651.91	
Animals	8,204.60	
Mechanical and other equipment	8,477.17	
Material and supplies on hand in storehouses	8,590.00	
Undistributed cost (freight and handling on inventory property)	143.57	
Total		33,067.25
Construction work in process:		
Gross expenditures for construction of project to date	386,457.20	
Less revenue earned during construction, as follows:		
Rentals of cottages	$137.44	
Miscellaneous revenues	255.55	
Profits on mess houses	518.68	
Profits on mercantile stores	7,549.38	
Profits on hospitals	203.22	
Adjustments:		
Depreciation on plant and equipment	1,059.63	
Profits shown on Government animals	146.55	
Total deductions	9,870.45	
Net expenditures for construction of project to date		376,586.75
Total assets		457,140.82

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$10,068.96	
Unpaid purchases		4,031.72	
Unpaid freight and express charges		2,033.55	
Unpaid passenger fares		37.35	
Unredeemed coupon books		170.45	
Total			$16,342.03
Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contract with Indian Service			378,389.14
Net investment:			
Disbursements	$371,216.50		
Transfers received from other projects	38,383.11		
		$409,599.61	
Less—			
Collections	334,577.25		
Transfers issued to other projects	12,612.71		
		347,189.96	
Total			62,409.65
Total liabilities, reserves, and capital investment of the Government			457,140.82

Functional feature costs of Fort Peck project to June 30, 1914.

Development (storage) works	$9,495.81
Carriage system	246,261.74
Distribution system	81,988.45
Real estate	7,707.44
Roads and bridges	2,896.34
Miscellaneous preliminary investigations	30,857.68
Operation and maintenance during construction	5,949.03
Cost ledger inventories	1,300.71
Gross expenditures for construction of project to date	386,457.20

Estimated cost of contemplated work, Fort Peck project, during fiscal year 1915.

Carriage system:		
Big Porcupine unit	$22,305.00	
Poplar River unit	1,100.00	
Big Muddy unit	80,000.00	
		$103,405.00
Distribution system:		
Big Porcupine unit	43,300.00	
Poplar River unit	22,000.00	
		65,300.00
Telephone lines, Big Porcupine unit		100.00
Roads and bridges:		
Little Porcupine unit	200.00	
Big Porcupine unit	1,000.00	
Poplar River unit	200.00	
		1,400.00
Miscellaneous preliminary investigations:		
Stream gauging	2,000.00	
Big Muddy unit, surveys	5,000.00	
		7,000.00
Operation and maintenance during construction		5,000.00
Cost ledger inventories		2,000.00
Total		184,205.00

MONTANA, HUNTLEY PROJECT.

R. H. Fifield, project manager, Huntley, Mont.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

County: Yellowstone.

Townships: 2 and 3 N., Rs. 27 to 31 E., Montana meridian.

Railroads: Northern Pacific; Chicago, Burlington & Quincy.

Railroad stations and estimated population January 1, 1914: Huntley, 150; Osborn;[1] Worden, 100; Newton;[1] Pompeys Pillar, 75; Bull Mountain;[1] Ballantine, 100; and Anita,[1] Mont.

WATER SUPPLY.

Source of water supply: Yellowstone River.

Area of drainage basin: 12,000 square miles.

Annual run-off in acre-feet of Yellowstone River at Huntley (12,000 square miles), 1908 to 1913: Maximum, 7,391,600; minimum, 5,280,000; mean, 6,335,517.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1914: 28,808 acres.

Area under water-right applications, season 1914: 24,756.52 acres.

Length of irrigating season: May 1 to September 30 (153 days).

Average elevation of irrigable area: 3,000 feet above sea level.

Average annual rainfall on irrigable area: 7 years, 13.81 inches; 1913, 12.49 inches. Relatively dry year.

Range of temperature on irrigable area: —35° to 100° F.

Character of soil of irrigable area: Ranges from heavy clay to light sandy loam.

Principal products: Alfalfa, oats, sugar beets, and wheat.

Principal markets: Billings, Mont.; St. Paul and Minneapolis, Minn.; Denver, Colo.; Kansas City, Mo.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: May 21, 1907; March 3, 1909; March 13, 1912; June 23, July 21, August 9, 1913.

Location of lands opened: Tps. 2 and 3 N., Rs. 27 to 31 E., M. M.

Present status of irrigable lands opened: 24,020.71 acres entered subject to the reclamation act; 1,595.46 acres open to entry; 3,192 acres in private ownership.

Limit of area of farm units: 160 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: Public land, $30 per acre, additional charge of $4 per acre to Indians; private land, $50 per acre since December 1, 1913.

Annual operation and maintenance charge: Lands entered prior to August 9, 1913, $1 per acre of irrigable land; for lands entered subsequent to August 9, 1913, $1 per acre of irrigable land, which entitles the water user to one acre-foot of water for each acre of land irrigated, and additional water furnished at the rate of 50 cents per acre-foot.

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[1] Less than 25 population.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1904.
Construction recommended by board of engineers February 26, 1905.
Construction authorized by Secretary April 18, 1905.
First irrigation by Reclamation Service, season 1908.
Main unit completed in 1908.
Entire project 98 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Huntley project provides for the diversion of water from the south side of the Yellowstone River, about 2 miles above Huntley, Mont., into a main canal which extends down the valley about 27 miles to a point 2 miles east of Bull Mountain. The greater portion of the water is distributed by gravity. Fourteen miles below the head gates a pumping plant is installed, and a small portion of the water is lifted 45 feet into a high-line canal, which will feed the proposed high-line equalizing reservoir. The high-line and reservoir-line canals serve about 5,160 acres of land above the main canal, in the vicinity of Ballantine, Anita, and Pompeys Pillar. The pumping plant is a reinforced concrete building containing two pumping units, each with a capacity of 28 second-feet and each comprising a turbine water wheel directly connected with a centrifugal pump by means of a vertical shaft. Two hundred and eighty-six net horsepower is developed by a 34-foot drop in the main canal.

The proposed high-line canal reservoir will be located 7 miles below the intake of the high-line canal and will have a storage capacity of 853 acre-feet, created by throwing an earthen dam containing 151,350 cubic yards of material across the mouth of a coulee in the vicinity of Anita, Mont. The water stored in the equalizing reservoir will insure at all times an adequate supply to the reservoir-line canal, which at present is fed direct from the high-line canal by a 34-foot concrete drop. During the present season the main canal is being utilized for irrigation purposes only as far as Lost Boy Creek and the high-line canal as far as the reservoir site. Practically all proposed construction, with the exception of the reservoir, was completed at the end of the fiscal year 1913.

The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The entire project is completed, with the exception of the proposed high-line canal reservoir and three small structures coming under the extension of the high-line canal, which have been partly constructed.

DRAINAGE.

Drains Nos. 6, 7, 8, and 9, aggregating 40,800 linear feet, were constructed under contract, and drains Nos. 10, 11, 14, and the extension of No. 9, aggregating 47,707 linear feet, were constructed by Government forces. In addition to the above, 8,500 linear feet of open drains, serving as outlets to tile drains, were lowered to proper grade by Government forces.

The contractor started work on July 9, 1913, and completed the contract April 13, 1914. Work by Government forces was in progress at the beginning and close of the fiscal year. Both contract and Government work were suspended from December 20, 1913, to April 1, 1914, on account of climatic conditions.

All of the drains, except those designated as open outlets, are deep, closed drains, intended for removing the excess water which finds its way into the subsoil through underground losses from irrigation or seepage from canals. In locating the drains, careful investigations were made of the subsoil conditions, and the drains were located as far as practicable in pervious or water-bearing materials. The

results obtained have been a general lowering of the ground waters over those areas tributary to the drains.

The closed drains apparently possess advantages over the open ones on this project, in that the required depth can be more easily maintained in them over much of the material encountered than is the case with an open drain.

OPERATION AND MAINTENANCE.

The operating season of 1913 opened May 9 and closed September 22. The season was quite dry and there were heavy demands for water during periods in July and August. Owing to a number of light rains about the 20th of September the irrigation season closed 10 days earlier than usual.

The operating season of 1914 proper did not begin until May 25. Water had previously been turned into the main canal for irrigating purposes on May 8 and 15, but subsequent rains made irrigation unnecessary in each case and the water was again turned out.

Water was delivered under a 4-day rotation system providing for a continuous flow in the laterals and the rotation of alternate farm units. The entire canal system, comprising 194 miles of canals and the pumping plant, serving the first unit of the project, was in operation.

During the irrigation season there were no unusual rainstorms to give trouble and no serious breaks in the canals. A small maintenance force was employed throughout the operating season mowing weeds and making minor repairs to canals and structures, the greater portion of the work being performed during the fall of 1913 and the spring of 1914.

Historical review, Huntley project.

Item.	1909	1910	1911	1912	1913	1914[1]
Acreage for which service was prepared to supply water.	28,805	28,805	28,805	28,805	28,805	28,808
Acreage irrigated	6,000	8,000	12,000	14,425	15,798	18,000
Miles of canal operated	155	175	175	194	194	194
Water diverted (acre-feet)			48,788	46,994	54,702	60,000
Water delivered to land (acre-feet)	12,000	15,767	22,550	21,437	24,118	27,000
Per acre of land irrigated (acre-feet)	2.0	2.03	1.88	1.5	1.53	1.5

[1] Estimated.

SETTLEMENT.

During the fiscal year there were nine new filings, four farms changed hands by relinquishment, and nine farms changed hands by assignment and transfer. Apparently the majority of the present population on the project is permanently settled; the speculators and the floating class of settlers are being gradually replaced by permanent settlers.

In the summer of 1913 a number of settlers in the vicinity of Huntley formed a dairy association for the purpose of purchasing dairy stock. The project was financed by the Huntley State Bank, and several carloads of Holstein cattle were purchased. The settlers

are gradually accumulating large numbers of dairy cows, hogs, and other stock, and each year finds them feeding more of their products on the farms. At the end of the fiscal year the settlers as a whole were in much better circumstances than ever before.

Settlement data, Huntley project.

Item.	1912	1913	1914
1. Total number of farms on project	585	585	586
2. Population of (1)	1,420	1,659	1,700
3. Number of irrigated farms	480	527	535
4. Operated by owners or managers	.....	.....	432
5. Operated by tenants	.....	.....	103
6. Population of (3)	1,420	1,659	1,700
7. Number of towns	8	8	8
8. Population of (7)	325	350	475
9. Total population in towns and on farms, sum of (2) and (8)	1,745	2,009	2,175
10. Number of public schools	13	13	14
11. Number of churches	5	5	6
12. Number of banks	2	2	3
13. Total capital stock	$40,000	$40,000	$60,000
14. Total amount of deposits	.....	.....	$220,000
15. Total number of depositors	.....	.....	886
16. Number of relinquishments	27	16	4
17. Number of cancellations	5	.....	1

PRINCIPAL CROPS.

During the season of 1913 there were 15,798 acres of land in irrigated crops. Sugar beets was the most profitable crop and next to alfalfa comprised the largest acreage. The yield averaged 10.17 tons per acre for the whole project, being 1.87 tons per acre greater than the yield for 1912. The maximum yield reported was 25 tons per acre. The gross return from the beet crop amounted to $273,066.

The alfalfa crop came next to sugar beets in value and for the first time surpassed the beets in acreage. The acreage of alfalfa has increased each year, and for the year 1913 comprised about one-third of the total cropped area. The season was favorable for the alfalfa crop, and the total yield amounted to 16,725 tons. The average yield was 3.45 tons per acre, which was 0.85 ton greater than the yield for 1912. A larger portion of the hay was fed on the farms than in previous years. The gross value of the alfalfa crop amounted to $91,987.

A total of 5,446 acres of land were seeded to small grains. These crops did exceptionally well and some good yields were reported. The acreage in oats was 3,942, and wheat came next with an acreage of 1,177. The remaining acreage was divided between barley, flax, and spelts. The gross returns from the small grain crops amounted to $52,681.

Potatoes and cucumbers, although two of the smallest crops in acreage, produced net average returns per acre above the other crops.

The remaining crops, comprising blue stem and timothy hay, millet, and garden truck, made up a small acreage, but were good paying crops. The gross crop returns for the year amounted to $464,698, which surpassed that of the previous year by $104,627.

At the end of the fiscal year the crops were in excellent condition, and the prospects are good that the crop returns of 1914 will exceed those of 1913. There are 17,078 acres in crops.

Crop report, Huntley project, year of 1913.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	4,848	Ton	16,725	3.45	$5.50	$91,987	$18.97
Barley	191	Bushel	2,535	13.27	.48	1,217	6.37
Beans	39	do	306	7.85	3.00	918	23.55
Blue-stem hay	292	Ton	543	1.86	12.00	6,516	22.32
Cucumbers	40	Pound	600,000	15,000	.01	6,000	150.00
Corn	326	Bushel	5,418	16.62	1.05	5,689	17.45
Flax	89	do	539	6.06	1.20	647	7.27
Millet	10	Ton	15	1.50	6.00	90	9.00
Oats	3,942	Bushel	113,766	28.86	.32	36,405	9.24
Potatoes	99	do	11,889	120.10	.45	5,350	54.04
Sugar beets	4,475	Ton	45,511	10.17	6.00	273,066	61.02
Spelt	47	Bushel	470	10.00	.60	282	6.00
Truck	218	Dollar			100.00	21,800	100.00
Timothy	33	Ton	50	1.52	12.00	600	18.20
Wheat	1,177	Bushel	21,410	18.19	.66	14,131	12.00
Less duplicated areas	28						
Total irrigated and cropped	15,798						
Total and average						464,698	29.35

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	23,577	527
Total irrigated area farms reported	15,798	527
Under water-right applications	15,798	527
Total cropped area farms reported	15,798	527

PUBLIC NOTICE, DATED AUGUST 9, 1913.

1. In pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, notice is hereby given that for all water-right applications for lands in private ownership filed on or after December 1, 1913, the building charge shall be $50 per acre, payable in installments, as follows:

First installment	$10
Second installment	1
Third installment	2
Fourth installment	3
Fifth installment	4
Sixth installment	5
Seventh installment	5
Eighth installment	5
Ninth installment	5
Tenth installment	10

2. The first payment on account of such water-right application shall consist of the first installment of the building charge plus the operation and maintenance charges then in force for the first unit of the project, and shall be payable at the time of the filing of the application in the local project office. The second payment shall be due on December 1 of the next calendar year, and subsequent payments shall be due on December 1 of each year thereafter.

3. For land for which water-right application is made in the first unit after the date of this notice, whether private land or entered land, in cases where there has been no written assignment of credits

by former entrymen, the operation and maintenance charge, until further notice, shall be $1 per acre per annum whether water is used thereon or not, and payment thereof will entitle the water user to one acre-foot of water for each acre of land irrigated. Additional water will be furnished at the rate of 50 cents per acre-foot.

4. In all other respects, water-right applications for such private and entered lands shall be subject to the payments and conditions prescribed in the public notices and orders heretofore issued for the Huntley project, the same being for the first unit thereof.

5. All payments shall be made to the special fiscal agent of the Reclamation Service assigned to make collections for the Huntley project.

A. A. JONES,
Acting Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Huntley project, to June 30, 1914.

ASSETS.

Accounts receivable:			
Uncollected freight refunds		$0.90	
Construction charges due and uncollected from water-right applicants		75,526.18	
Operation and maintenance charges due and uncollected from water-right applicants		4,210.33	
Total			$79,737.41
Inventories:			
Animals		$1,417.00	
Mechanical and other equipment		12,651.00	
Material and supplies on hand in storehouses		23,127.73	
Unadjusted transfers between projects		[1] 170.15	
Undistributed cost (freight and handling on inventory property)		7.16	
Total			37,032.74
Construction work in process:			
Gross expenditures for construction of project to date		$973,411.87	
Less revenue earned during construction, as follows:			
Rentals of cottages	$315.00		
Rentals of grazing lands	1,100.69		
Rentals of telephones	406.79		
Miscellaneous revenues	212.00		
Profits on hospitals	1,449.04		
Receipts from sale of townsites	34,279.07		
Contractors' freight refunds	7,552.24		
Adjustments:			
Depreciation on plant and equipment	1,048.75		
Repairs to equipment	[1] 3,186.17		
Profits shown on Government animals	302.05		
Total deductions		43,479.46	
Net expenditures for construction of project to date			929,932.41
Deferred operation and maintenance charges			310,257.51
Total assets			1,356,960.07

[1] Deduct.

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$9,298.25	
Unpaid purchases		5,137.09	
Unpaid contract holdbacks		3,630.70	
Unpaid freight and express charges		5,228.15	
Unpaid passenger fares		108.24	
Total			$23,402.43
Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		$306,218.21	
Construction charges paid in advance by water-right applicants		6,545.77	
Construction charges paid and forfeited by water-right applicants		3,289.68	
Total			316,053.66
Net investment:			
Disbursements	$1,506,049.72		
Transfers received from other projects	62,600.45		
		$1,568,650.17	
Less—			
Collections	391,538.81		
Transfers issued to other projects	159,607.38		
		551,146.19	
Total			1,017,503.98
Total liabilities, reserves, and capital investment of the Government			1,356,960.07

Functional feature costs of Huntley project to June 30, 1914.

Carriage system	$637,948.52
Distribution system	290,035.99
Real estate	17,785.46
Telephone lines	9,041.01
Miscellaneous preliminary investigations	18,600.89
Gross expenditures for construction of project to date	973,411.87

Operating revenues and expenses, Huntley project, to June 30, 1914.

EXPENSES.

Carriage system:	
Operation	$10,835.38
Maintenance	21,228.32
Distribution system:	
Operation	21,096.56
Maintenance	105,558.73
Drainage and flood-protection system, maintenance	3,659.88
Undistributed expenses, maintenance	17,873.10
Supplemental construction	219,010.83
Total	399,262.80

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$84,877.76
Operation and maintenance charges paid in advance by water-right applicants	47.75

Operation and maintenance charges paid and forfeited by water-right applicants	$851.23
Rentals of lands and buildings	3,096.80
Rentals of irrigating water	91.75
Miscellaneous revenues	40.00
Deferred operation and maintenance revenues (carried to the debit side of assets and liabilities statement)	310,257.51
Total	399,262.80

Estimated cost of contemplated works, Huntley project, during fiscal year 1915.

Development (storage) works:		
151,350 cubic yards embankment, at 35 cents	$52,972.50	
400 cubic yards excavation for structures, at 50 cents	200.00	
15 cubic yards concrete plain, at $14	210.00	
140 cubic yards concrete, reinforced, at $20	2,800.00	
100 cubic yards puddling, at $1	100.00	
10 cubic yards riprap, at $6	60.00	
30 square yards grouted paving, at $2	60.00	
Gates and guides	500.00	
Engineering, etc	11,644.13	
Total		$68,546.63
Distribution system:		
6,000 cubic yards excavation, class 1, at 30 cents	1,800.00	
6 lateral crossings under Northern Pacific Ry., at $500	3,000.00	
To complete steel pressure pipe crossing High Line Canal, station, 429–437	800.00	
Engineering, etc	952.00	
Total		6,552.00
Drainage and flood protection system		149,742.00
Operation and maintenance under public notice		40,185.00
Total		265,025.63

MONTANA, MILK RIVER PROJECT.

W. W. SCHLECHT, project manager, Malta, Mont.; JOSEPH WRIGHT, engineer, St. Mary storage unit, Fletcher, Mont.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Teton, Hill, Blaine, and Valley.

Townships: 34 to 37 N., R. 14 W.; 34 N., R. 15 W.; 37 N., Rs. 11 to 13 W.; 27 to 33 N., Rs. 17 to 42 E., Montana meridian.

Railroads: Great Northern and Canadian Pacific.

Railroad stations and estimated population January 1, 1914: Browning; Havre, 5,000; Chinook, 1,300; Harlem, 700; Savoy, 40; Coburg, 30; Dodson, 300; Wagner, 75; Malta, 800; Saco, 600; Hinsdale, 400; Glasgow, 1,800; and Nashua, Mont., 200; Cardston and Woolford, Canada.

WATER SUPPLY.

Source of water supply: St. Mary Lakes, Swift Current Creek, and Milk River.

Area of drainage basin: St. Mary Lakes and Swift Current Creek, 298 square miles; Milk River at Havre, 5,500 square miles; Milk River at Malta, 13,000 square miles; Milk River at Hinsdale, 22,000 square miles.

Annual run-off in acre-feet of St. Mary River (including Swift Current Creek): At Babb (298 square miles), 1902–1913—maximum, 830,000; minimum, 469,000; mean, 618,357. At International Line (452 square miles), 1903–1912—maximum, 1,107,300; minimum, 514,100; mean, 744,800. Of Milk River: At Havre (5,500 square miles), 1898–1913—maximum, 426,000; minimum, 17,100; mean, 207,500. At Malta (13,000 square miles), 1903–1913—maximum, 647,000; minimum, 29,400; mean, 304,000. At Hinsdale (22,000 square miles), 1909–1913—maximum, 1,299,000; minimum, 207,000; mean, 574,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1914, 14,000 acres.

Area under rental contracts, season 1914, 2,150 acres.

Length of irrigating season: From April 1 to September 15, 168 days.

Average elevation of St. Mary storage: 4,500 feet above sea level.

Average elevation of irrigable area: 2,200 feet above sea level.

Average annual rainfall on St. Mary storage: About 24 inches (Teton County, including the snow equivalent).

Average annual rainfall on irrigable area: At Havre, 34 years, 13.67 inches; 1913, 11.37 inches; at Malta, 8 years, 13.40 inches; 1913, 11.29 inches.

Range of temperature on irrigable area, —50° to 103° F.

Character of soil of irrigable area: Sandy loam, clayey loam, and some gumbo.

Principal products: Alfalfa and other fodder crops, grain, and vegetables.

Principal markets: Minneapolis and St. Paul, Minn., Great Falls, Mont., and local.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. The irrigated area during 1911 was 2,074 acres, during 1912, 353 acres, during 1913, 2,545 acres, and during 1914 to June 30, 2,150 acres.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun by the Reclamation Service in 1902.

Construction recommended by director March 7, 1903.

Construction conditionally authorized by Secretary March 14, 1903.

Construction of St. Mary storage unit recommended by board of engineers September 19, 1904.

Construction of St. Mary storage unit authorized by Secretary March 25, 1905.

Construction begun July 27, 1906.

Dodson Diversion Dam completed in January, 1910.

Treaty with Great Britain relating to distribution between Canada and the United States of the waters of St. Mary and Milk Rivers signed January 11, 1909, and proclaimed May 13, 1910.

Recommendations covering construction of the project approved by Secretary June 13, 1912.

Earthwork of Vandalia South Canal completed May 1914.

Earthwork of Dodson South Canal completed May, 1914.

Milk River unit 35 per cent completed June 30, 1914.

St. Mary storage unit 30 per cent completed June 30, 1914.

Entire project 34 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Milk River project provides for the storage of water in the Sherburne Lakes and the St. Mary Lakes, and its diversion through a canal 28.8 miles long, heading three-fourths of a mile below the reservoir and discharging into the North Fork of Milk River, thence flowing through Canada for 100 miles or more and returning to the United States; the storage of water in Nelson Reservoir south of Milk River and 14 miles northeast of Malta; the discharge of stored water into Milk River as required; the diversion of water from Milk River by a dam near Chinook into two canals, one on each side of the river, for the irrigation of lands near Chinook and Harlem, comprising the Chinook division; the diversion of water from Milk River by a dam near Dodson into two canals, the north side canal irrigating lands near Dodson, Wagner, and Malta, and the south side canal conveying water to Nelson Reservoir and irrigating lands near Wagner, Malta, Bowdoin, and Ashfield; the irrigation of lands on both sides of Milk River and Beaver Creek in the vicinity of Saco and Hinsdale from the stored waters of Nelson Reservoir, comprising the Malta division; and in the Glasgow division the diversion of water at Vandalia Dam into a canal on the south side of Milk River for the irrigation of lands near Tampico, Glasgow, and Nashua. In case the normal flow of Milk River at Vandalia Dam is not sufficient for the irrigation of lands in the Glasgow division, the stored waters in Nelson Reservoir will be returned to Milk River and diverted again at Vandalia Dam. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan which have been completed are: 10.4 miles of the St. Mary Canal; the Dodson diversion dam to the height of the fixed crest; headworks for the Dodson North and South Canals; 10 miles of Dodson South Canal, with a capacity of 900 second-feet, including Point of Rocks equalizing reservoir, 34 miles with a capacity of 500 second-feet, and the lateral system to cover about 9,000 acres above Malta; 20 miles of the Dodson North Canal, with from 200 to 100 second-feet capacity, including laterals and structures, supplying water to about 5,000 acres in the vicinity of Dodson, and 46 miles of Vandalia South Canal, with from 250 to 10 second-feet capacity. The work under construction comprises the St. Mary Canal; the distribution system of the Dodson South Canal, first and second units, to irrigate about 10,000 acres; the distribution system for the Dodson North Canal, first and second units, to irrigate about 8,000 acres; the distribution system for the first and second units of the Vandalia South Canal, to irrigate about 12,000 acres; and the Vandalia diversion and headworks. The principal features remaining to be completed are the St. Mary Lakes and Sherburne Lakes storage works, and 18.4 miles of the St. Mary Canal, with all its structures; the Chinook division, comprising the diversion dam and the Chinook North and South Canals; Nelson Reservoir; Nelson North, Nelson South, Bowdoin, and Ashfield canal systems; the movable crest for Dodson Dam and the repairs to Dodson South Canal at Dodson Bridge.

CONSTRUCTION DURING FISCAL YEAR.

MILK RIVER PROJECT.

On Dodson North Canal the contracts for the earthwork to Exeter were completed early in December, 1913. On August 30, 1913, a contract was let for the construction of the laterals, waste-water ditches, and structures of the second unit, Dodson North Canal. On this work several crossings under the Great Northern Railway were required and contract was entered into with the railway company to provide temporary bridges to carry the track until the permanent structures could be built by the contractor. This contract for laterals, waste-water ditches, and structures is at present 85 per cent completed, and when finished will reclaim approximately 6,000 acres in the vicinity of Malta.

On Dodson South Canal the contractors were engaged on the earthwork necessary for the enlargement and extension of 34 miles between Point of Rocks and Nelson Reservoir. The team work, comprising 31 miles of this extension, was completed on November 1, 1913, and the machine work, comprising 3 miles of heavy cut, on May 29, 1914. On June 10, 1914, bids were opened for the completion of structures on the Dodson South Canal extension and for the earthwork and structures of the lateral system to cover about 4,000 acres lying between Alkali Creek and Lake Bowdoin. This contract is to be completed on or before May 31, 1915. The extension of the Upper Peoples Creek dike was begun during August, 1913, and completed in September, thereby finishing all work in this vicinity. On October 10, 1913, a contract was awarded for the extension and completion of the earthwork for the laterals and waste-water ditches on the first unit of the Dodson South Canal. A large force was employed on this work, which was completed during December, 1913.

At Vandalia Diversion active work by Government forces was begun on August 1, 1913, the force employed ranging from 60 men during the winter months to 180 men during the more favorable construction season. Work has been concentrated on the foundation for the dam, two abutments, and the auxiliary spillway, and at present this feature is 50 per cent completed.

The contracts for the earthwork of the Vandalia South Canal were completed during May, 1914. Contracts for the earthwork and structures of the first unit, Vandalia South Canal, were let during December, 1913. The work was begun during March, 1914, and is at present about 45 per cent completed.

On June 8 contract was awarded for the earthwork of the auxiliary spillway channel of Vandalia Diversion.

On May 20 bids were opened for the earthwork and structures of the second unit, Vandalia South Canal, and on May 27 for the earthwork and structures of the Vandalia South Canal at Vandalia Point.

These contracts and the work under way will complete the Dodson North Canal, Dodson South Canal, and Vandalia South Canal systems to irrigate approximately 40,000 acres.

ST. MARY STORAGE UNIT.

The principal work comprised the completion of the excavation of the St. Mary Canal between stations 277 and 486 and between

stations 235 and 263; the construction of a telephone line from the headworks to the St. Mary Crossing, 11 miles, and from the headworks to Sherburne Lakes Reservoir Dam site, 6.5 miles; the construction of a highway from the headworks to Sherburne Lakes Reservoir Dam site, 6.5 miles; the construction of a temporary camp for engineers on mile 23 of the St. Mary Canal; the partial construction of a construction camp at the Sherburne Lakes Reservoir Dam site; the rafting to the sawmill at the foot of Lower St. Mary Lake of 470,000 feet b. m. of logs, and the sawing of 178,000 feet b. m. of lumber; and subsoil investigations of the Sherburne Lakes Reservoir Dam site. All the above work was accomplished with Government forces.

Contracts were awarded for the construction of the St. Mary Canal and all of its structures, except the St. Mary River Crossing and Hall's Coulee Crossing pressure pipes. The contracts for the earthwork of schedules 1, 3, and 4 were awarded in July and August of 1913, and for the earthwork of schedules 2a and 21 and for the structures in May and June, 1914.

The contract for schedule 1 is now 50 per cent completed; schedule 3, 36½ per cent; schedule 4, 62 per cent; and schedule 21, 15 per cent. Only a beginning has been made on the structures.

During the year 62,929 cubic yards were excavated from the St. Mary Canal by Government forces and 604,094 cubic yards by contract. The earthwork of the canal is now 43¼ per cent completed.

A part of the flowage lands at the foot of lower St. Mary Lake was farmed, with a view to the insurance of forage for Government animals. One hundred and ten acres were seeded to grasses, with oats as a nurse crop, in 1913, from which 225 tons of oat hay were harvested. In 1914, 60 acres were seeded to oats and 110 acres of grass irrigated.

Plans and specifications for the structures of the St. Mary Canal, and for the Sherburne Lakes Reservoir Dam, were prepared, and the contracts for the structures awarded during the year. At the end of the year preparations were being made to begin the construction of the Sherburne Lakes Reservoir Dam with Government forces. Detailed drawings of the structures of the St. Mary Canal have been prepared in pencil, and they are now being checked and traced. Additional topography in the proposed Sherburne Lakes Reservoir was taken during the year.

The installation of that part of the first line of pressure pipe of the St. Mary River Crossing lying west of the river, work on which was in progress at the beginning of the fiscal year, was completed and the backfilling placed.

OPERATION AND MAINTENANCE.

The system operated during 1913 consisted of the upper ends of both Dodson North and South Canals (about 10 miles of the North and 18 miles of the South). The North Canal heads with a capacity of 200 second-feet and the South Canal with a capacity of 900 second-feet, but was limited during the season of 1913 by a temporary flume across the break at Dodson Bridge to about 50 second-feet, which, by using the Point of Rocks equalizing reservoir for storage, was

ample to supply the demands. During April, May, and June, 1913, the rainfall was sufficient, and came at suitable intervals to keep the crops growing in good shape. The months following were dry and crops which were not irrigated suffered considerable damage, their yield being reduced by about 50 per cent. No hailstorms or damaging winds struck the project. The last killing frost occurred on April 10 and the first on September 25, 1913. The season of 1914 was very dry until the latter part of May, and the run-off of the river dropped to 2 second-feet, which was far from being ample to meet the demands of irrigators. By June 30 thirty applications had been received for water, to be applied to 2,200 acres.

Historical review, Milk River project.

Item.	1911	1912	1913	1914 [1]
Acreage for which service was prepared to supply water	7,800	7,800	12,800	14,000
Acreage irrigated	2,074	353	2,545	3,500
Number of farms irrigated	29	9	41	50
Miles of canal operated	30	30	50	55
Water diverted (acre-feet)	11,160	2,885	4,267	7,000
Water delivered to land (acre-feet)	2,853	293	2,349	4,000
Per acre of land irrigated (acre-feet)	1.28	0.82	0.92	1.00

[1] Estimated.

SETTLEMENT.

As no public notice announcing the opening of the project has been issued, no material progress has been made in settlement, although several transfers have been made of deeded lands. There are several large holdings of land, but as yet little has been done toward subdividing and selling the excess holdings. Water is being delivered to homestead lands in the Dodson units on a rental basis.

Settlement data of irrigated district, Milk River project.

Item.	1913	1914.[1]
1. Total number of farms on project	62	70
2. Population of (1)	126	150
3. Number of irrigated farms	41	50
4. Operated by owners or managers	32	32
5. Operated by tenants	9	18
6. Population of (3)	90	110
7. Number of towns	3	3
8. Population of (7)	900	1,200
9. Total population in towns and on farms (sum of (2) and (8))	1,026	1,350
10. Number of public schools	4	4
11. Number of churches	5	6
12. Number of banks	2	3
13. Total capital stock	$75,000	$95,000
14. Total amount of deposits	$450,000	$530,000
15. Total number of depositors	1,400	1,700
16. Number of relinquishments	0	0
17. Number of cancellations	0	0

[1] Estimated.

PRINCIPAL CROPS.

Grains occupied 80 per cent and hay 19 per cent of the lands cropped under irrigation from the Government system on the Milk River

project in 1913. Wheat alone occupied nearly 50 per cent of the area. The crop report from these lands follows:

Crop report, irrigated lands, Milk River project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa, new	60	Ton	62	1.0	$10.00	$620	$10.33
Alfalfa, old	155	do	339	2.2	10.00	3,390	21.87
Barley	35	Bushel	377	10.8	.36	135	3.85
Beets, sugar	3	Ton	6	2.0	5.00	30	10.00
Blue stem hay	597	do	519	.9	11.00	5,709	9.90
Flax	178	Bushel	1,429	8.0	1.24	1,772	9.95
Garden	2					150	75.00
Grain hay	26	Ton	11	.4	9.00	99	3.81
Oats	260	Bushel	7,084	27.2	.40	2,834	10.90
Potatoes	4	do	517	129.2	1.20	620	155.10
Wheat	1,139	do	13,301	11.7	.65	8,646	7.60
Total	2,459					24,005	9.76
Irrigated, no crop:							
Stubble	177						
Sod	64						
Less duplicated areas	155						
Total	86						
Total irrigated	2,545						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	7,309	41
Total irrigated area farms reported	2,545	41
Under rental contracts	2,545	41
Total cropped area farms reported	2,459	41

In comparison with these figures is the following report from unirrigated lands on the project. It is seen that about the same crops were grown on unirrigated as on irrigated lands and in about the same proportions of the area cropped. On the dry-farmed areas more grain and less hay were grown and the yields were generally poorer than on irrigated land.

Crop report, nonirrigated lands, Milk River project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa, new	10	Ton	10	1.0	$10.00	$100	$10.00
Alfalfa, old	19	do	30	1.6	10.00	300	15.79
Barley	88	Bushel	1,326	15.1	.36	477	5.42
Blue-stem hay	347	Ton	221	.6	11.00	2,431	7.01
Flax	212	Bushel	749	3.5	1.24	909	4.29
Grain hay	8	Ton	6	.8	9.00	54	6.75
Oats	510	Bushel	7,140	14.0	.40	2,856	5.60
Potatoes	6	do	625	104.2	1.20	760	126.67
Wheat	1,107	do	9,139	8.3	.65	5,940	5.37
Total cropped	2,307						
Total and average						13,827	5.99

ORDER DATED MARCH 4, 1914.

In order to provide for the relief of those settlers who have made homestead entries for lands withdrawn under the provisions of section 3 of the reclamation act of June 17, 1902 (32 Stat., 388), situated in what is known as the Chinook division, Milk River project, Montana, west of Dodson Dam, it is hereby ordered:

(1) For all such lands covered by existing uncompleted homestead entries the withdrawal under the reclamation act will be revoked as to lands held to be susceptible of irrigation to the end that patent may issue upon proper compliance with the general homestead laws; provided, that the reclamation withdrawal will not be revoked as to any such land until the entryman has become a member of the Water Users' Association, and has executed stock subscription and contract with the association covering the land, which has been recorded, and provided further, that when water is made available for the irrigation of the land the area for which any one entryman or his successor in interest may hold a water right under the project prior to full payment will be limited to 80 acres of irrigable land.

FRANKLIN K. LANE,
Secretary of the Interior.

ORDER DATED MARCH 11, 1914.

In order to provide for the relief of those settlers who have made homestead entries for lands withdrawn under the provisions of section 3 of the reclamation act of June 17, 1902 (32 Stat., 388), situated in what are known as the Malta and Glasgow divisions of the Milk River project, east of Dodson Dam, it is hereby ordered:

(1) For all lands situated east of Dodson Dam, for which water for irrigation is now or will probably be available within a period of five years, the withdrawal under the reclamation act shall remain intact and at the proper time such settlers will be required to conform their entries to establish farm units.

(2) For all lands situated east of Dodson Dam, covered by existing uncompleted homestead entries and for which water for irrigation will probably not be available within a period of five years, the withdrawal under the reclamation act will be revoked to the end that patent may issue upon proper compliance with the general homestead laws; provided, that the reclamation withdrawal will not be revoked as to such lands until the entrymen have become members of the Water Users' Association and executed stock subscriptions and contracts with the association covering the lands; and provided further, that when water is made available for the irrigation of the land no such settler or landowner will be permitted to acquire a water right under the project for an area in excess of 80 acres of irrigable land.

(3) Nothing herein contained shall be construed as in any way modifying the terms of departmental order of March 12, 1910, regarding a farm unit of 160 acres for lands in the Dodson South Canal unit, entered prior to that date and which are held by the original homestead entrymen.

ANDRIEUS A. JONES,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Milk River project, to June 30, 1914.

ASSETS.

Cash in fiscal agent's possession awaiting remittance		$9.05
Accounts receivable:		
Uncollected freight refunds	$10,266.16	
Uncollected water rentals	1,135.00	
Total		11,401.16
Inventories:		
Mercantile stores and stock on hand	4,320.74	
Animals	12,569.01	
Mechanical and other equipment	17,452.42	
Materials and supplies on hand in storehouses	36,927.42	
Goods in transit	754.19	
Undistributed cost (freight and handling on inventory property)	2,094.82	
Total		74,118.60
Construction work in process:		
Gross expenditures for construction of project to date	1,853,281.36	
Less revenue earned during construction, as follows:		
Rentals of cottages	$411.53	
Rentals of grazing lands	1,120.00	
Rentals of irrigation water	7,794.97	
Miscellaneous revenues	65.00	
Profits on mess houses	1,263.05	
Profits on mercantile stores	2,539.60	
Profits on hospitals	1,131.91	
Contractors' freight refunds	16,654.28	
Forfeitures by defaulting bidders and contractors	910.00	
Adjustments:		
Profits shown on Government animals	2,590.30	
Total deductions	34,480.64	
Net expenditures for construction of project to date		1,818,800.72
Total assets		1,904,329.53

LIABILITIES.

Accounts payable:		
Unpaid labor	$7,562.37	
Unpaid purchases	9,121.58	
Unpaid contract estimates	24,634.54	
Unpaid contract holdbacks	10,241.12	
Unpaid freight and express charges	28,798.16	
Unpaid passenger fares	291.20	
Unpaid agreements to purchase real estate	2,100.60	
Unredeemed coupon books	84.55	
Unpaid miscellaneous	440.96	
Total		83,275.08

Net investment:			
Disbursements	$1,759,565.47		
Transfers received from other projects	107,585.98		
		$1,867,151.45	
Less:			
Collections	23,318.47		
Transfers issued to other projects	22,778.53		
		46,097.00	
Total			$1,821,054.45
Total liabilities, reserves, and capital investment of the Government			1,904,329.53

Functional feature costs of Milk River project to June 30, 1914.

Development (storage) works	$425,766.27
Carriage system	989,516.86
Distribution system	282,198.95
Real estate	13,780.32
Miscellaneous preliminary investigations	96,709.34
Operation and maintenance during construction	38,793.89
Cost ledger inventories	6,515.73
Gross expenditures for construction of project to date	1,853,281.36

Estimated costs of contemplated work, Milk River project, during fiscal year 1915.

Development (storage) works:		
Dodson diversion	$36,755.73	
Vandalia diversion	195,000.00	
Nelson Reservoir	53,800.00	
Chinook diversion	15,000.00	
		$300,555.73
Carriage system:		
Dodson North Main Canal	21,688.28	
Dodson South Main Canal	71,532.21	
Vandalia South Canal	110,666.67	
Ashfield Main Canal	500.00	
Bowdoin Main Canal	73,000.00	
Nelson Reservoir Main Canal	4,500.00	
Chinook Main Canal	9,500.00	
		291,387.16
Distribution system:		
Dodson North Main Canal	43,376.56	
Dodson South Main Canal	137,064.42	
Vandalia South Canal	211,333.33	
Ashfield Main Canal	2,000.00	
Bowdoin Main Canal	49,500.00	
Nelson Reservoir Main Canal	7,000.00	
Chinook Main Canal	7,500.00	
		457,774.31
Miscellaneous preliminary investigations:		
Examination of project as a whole		6,045.66
Operation and maintenance during construction		7,000.00
Total		1,062,762.86

Assets, liabilities, reserves, and capital, St. Mary storage unit, to June 30, 1914.

ASSETS.

Cash in fiscal agent's possession awaiting remittance		$366.32
Accounts receivable:		
Uncollected freight refunds	$438.80	
Uncollected miscellaneous items	253.08	
Total		691.88
Inventories:		
Mercantile stores stock on hand	1,258.15	
Animals	8,011.00	
Mechanical and other equipment	40,106.67	
Material and supplies on hand in storehouses	53,024.24	
Goods in transit	2,035.45	
Unadjusted transfers between projects	4,691.61	
Undistributed cost (freight and handling on inventory property)	4,589.64	
Total		113,716.76
Construction work in process:		
Gross expenditures for construction of project to date	760,210.00	
Less revenue earned during construction:		
Rentals of cottages	$3,934.00	
Rentals of telephones	366.84	
Miscellaneous revenues	8.50	
Loss on mess houses	[1] 2,729.70	
Profits on mercantile stores	4,046.24	
Profits on hospitals	439.29	
Profits on blacksmith shops	23.24	
Contractors' freight refunds	818.28	
Forfeitures by defaulting bidders and contractors	110.00	
Loss shown on Government animals	[1] 10,110.15	
Total deductions	[1] 3,093.46	
Net expenditures for construction of project to date		763,303.46
Total assets		878,078.42

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$2,817.28	
Unpaid purchases	3,539.37	
Unpaid contract estimates	40,089.35	
Unpaid contract holdbacks	14,060.43	
Unpaid freight and express charges	7,845.83	
Unpaid passenger fares	33.65	
Unredeemed meal tickets	2.00	
Total		$68,387.91
Net investment:		
Disbursements	$765,411.13	
Transfers received from other projects	108,810.53	
	874,221.66	
Collections	20,755.20	
Transfers issued to other projects	43,775.95	
	64,531.15	
Total		809,690.51
Total liabilities, reserves, and capital investment of the Government		878,078.42

[1] Deduct.

Functional feature costs of St. Mary storage unit to June 30, 1914.

Development (storage) works	$35,117.40
Carriage system	500,568.47
Power system	4,099.43
Real estate	19,467.26
Telephone lines	14,946.53
Roads and bridges	125,187.71
Miscellaneous preliminary investigations	50,782.68
Cost-ledger inventories	10,040.52
Gross expenditures for construction of project to date	760,210.00

Estimated cost of contemplated work St. Mary storage unit during fiscal year 1915.

Development (storage) works:		
Swift current diversion	$63,000	
Sherburne Lake Reservoir	237,000	
		$300,000
Carriage system:		
St. Mary Crossing, pipe and bridge	48,500	
Halls Coulee Crossing, pipe	14,000	
Earthwork	397,600	
St. Mary Canal, headworks	57,500	
Highway Bridge over main canal	10,200	
Check gate, Station No. 91	4,600	
Kennedy Creek Crossing	34,000	
Control and sluice gate, station 277/50	6,000	
Kennedy Creek Dikes	22,000	
Powell Creek Crossing	9,500	
St. Mary Crossing, except pipe work	40,000	
Spider Coulee flume	19,000	
Control gate, Station No. 615	5,000	
Cow Creek Crossing	5,000	
Sluice gate, Station No. 884	7,500	
Intake and outlet, Halls Coulee Crossing	10,000	
Pipe culverts	2,500	
Concrete drops and canal excavation	47,500	
Earth dams and canal excavation	40,000	
Upham's culvert at Station 284	750	
		781,150
Real estate, purchase of lands for right of way		12,000
Telephone lines, maintenance		500
Roads and bridges, maintenance		2,000
Total		1,095,650

MONTANA, SUN RIVER PROJECT.

R. M. SNELL, project manager, Fort Shaw, Mont.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Teton, Lewis and Clark, Choteau, Cascade.
Townships: 20 to 23 N., Rs. 6 E. to 8 W., Montana meridian.
Railroads: Great Northern; Chicago, Milwaukee & St. Paul.
Railroad stations and estimated population, January 1, 1914: Vaughn, 100; Power, 75; Dutton, 125; Collins, 100; Largent;[1] Fort Shaw, 103; Simms, 185; Riebling;[1] Gilman, 300; and Choteau, 1,000.

WATER SUPPLY.

Source of water supply: Sun River and tributaries, Deep Creek, Bowl Creek, and Basin Creek.
Area of drainage basins: Sun River, 1,070 square miles; Deep Creek, 260 square miles; Bowl Creek, 9 square miles; Basin Creek, 15 square miles.
Annual run-off in acre-feet: North Fork of Sun River, near Augusta, 1905–1913, maximum, 805,000; minimum, 378,000; mean, 656,000. Willow Creek near Augusta, 1906–1913, maximum, 35,300; minimum, 7,900; mean, 21,000. Sun River at Sun River, 1906–1913, maximum, 1,140,000; minimum, 390,000; mean, 804,000. South Fork of Sun River, near Augusta, 1905–1913, maximum, 147,000; minimum, 28,000; mean, 77,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: 16,346 acres.
Area under water-right applications, season of 1914: 10,611.20 acres.
Area under rental contracts, season of 1914: 194 acres.
Length of irrigating season: From May 15 to October 1—138 days.
Average elevation of irrigable area: 3,700 feet above sea level.
Average annual rainfall on irrigable area: 26 years, 12.01 inches; 1913, 12.25 inches.
Range of temperature on irrigable area: —40° to 100° F.
Character of soil of irrigable area: Sandy loam, clay, adobe, and alluvium.
Principal products: Hay, grain, and vegetables.
Principal markets: Great Falls, Helena, and Butte, Mont.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: March 26, 1908; November 19, 1910; March 28, 1911; March 2, July 13, 1912; June 23, 1913.
Location of lands opened: Tps. 20 and 21 N., Rs. 1 to 3 W., Montana meridian.
Present status of irrigable lands opened: 10,211.20 acres entered, subject to the reclamation act; 3,041.16 acres open to entry; 281 acres of State lands; 1,896 acres in private ownership, which have not applied for water; 400 acres in private ownership, which have applied for water.
Limit of area of farm units: 160 acres:
Duty of water: 2 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $30 and $36.
Annual operation and maintenance charge: $1 per acre of irrigable land.

[1] Population less than 25.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1905.
Construction recommended by board of engineers, February 13, 1906.
Construction authorized by Secretary February 26, 1906.
Fort Shaw Main Canal completed July, 1908.
First irrigation by Reclamation Service, season of 1909.
Fort Shaw unit completed December, 1909.
Willow Creek Dam completed, present development, November 7, 1911.
Entire project 15.9 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Sun River project so far as approved provides for the storage of water in Sun River storage reservoir on the North Fork of Sun River; in the Willow Creek Reservoir, on Willow Creek; in Pishkun Reservoir, north of Sun River; the diversion of water from the North Fork of Sun River through supply canals for the Willow Creek and Pishkun Reservoirs; the diversion of water from Sun River, supplemented by stored waters released from Sun River storage and Willow Creek Reservoirs, into a canal system watering lands mainly in the abandoned Fort Shaw Military Reservation; and the diversion of water from Pishkun Reservoir into Sun River slope canal, supplying water for lands in the Sun River Valley.

Possible future development may include the storage of water in the Muddy Creek Reservoir, on Muddy Creek; the diversion of water from Bowl and Basin Creeks, tributaries of Flathead River, across the Continental Divide to Sun River drainage; and the diversion of flood waters from Deep Creek into Pishkun Reservoir.

The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The Fort Shaw unit and the Willow Creek Dam (first development) of the project are completed. The major portion of the diversion dam in Sun River canyon is built and the diversion tunnel driven. Drawings of the first mile of the Pishkun Reservoir supply canal are finished and the remainder of the canal and the structures thereon are under construction. The Sun River slope canal, with the structures appurtenant thereto, is also under construction, and drawings for the canals and structures for the irrigation of Greenfields Bench are in course of preparation, the necessary surveys having been made.

CONSTRUCTION DURING FISCAL YEAR.

The Sun River diversion dam has been constructed to elevation 4385, 6 feet above the low-water mark, and 95 feet remain to be added after the high water. The intake tunnel is driven but not lined, and the excavation for the controlling works completed. The heavy canal work under contract is handled by two electric draglines and a transmission line has been built from substation No. 3 of the Great Falls Power Co. at the diversion dam, 28 miles down the canal, to convey power to the contractors. MacArthur Bros. Co. have excavated under contract approximately 12 miles of canal, including 2 miles of heavy rock work, and 2,500 feet of tunnel. Thirty-four miles remain to be excavated under this contract to complete the canal system as far as Greenfields bench, and drawings are being made for the 65,000 acres composing this unit.

Hayden Bros. have completed three culverts on the canal and have started excavation on eight others. Their work is about 10 per cent completed.

Three camps to accommodate 20 men each have been built along the work under contract, for housing the engineers and field assist-

ants. The project office has been changed from the Fort Shaw townsite to the buildings formerly occupied by the Fort Shaw Indian School. A two-story concrete vault has been built and minor repairs to the building made.

OPERATION AND MAINTENANCE.

During the season of 1913 the entire system of 121 miles of canals and laterals on the Fort Shaw unit was in operation. 24,628 acre-feet of water being diverted and 179 farm units, comprising 7,491 acres, being irrigated. Fourteen thousand three hundred acre-feet were stored in Willow Creek Reservoir, but were not used, as the supply from the river was sufficient. Some land has become affected by seepage. Preliminary surveys and an investigation have been made for relieving the affected districts.

About one-half of the land under the canal system was irrigated, and only during the month of July was there a large demand for water, which was delivered upon demand and in such quantities as requested by the user. As a result there was an excessive demand during 10 days in the middle of July which resulted in unsatisfactory service, and to eliminate a repetition of this sort it was proposed to deliver water by rotation during the season of 1914. However, the rotation system was not desired by the water users and the same plan is being used as in 1913. A small force has been employed from time to time in riprapping and cleaning ditches, but no extensive repairs have been made.

Historical review, Sun River project.

Item.	1910	1911	1912	1913	1914
Acreage for which service was prepared to supply water	16,000	16,346	16,346	16,346	16,346
Acreage irrigated	4,194	6,892	6,824	7,491	8,500
Miles of canals operated	105	121	121	121	121
Water diverted (acre-feet)	30,499	24,192	20,392	24,628	21,250
Water delivered to land (acre-feet)	9,707	11,380	11,688	11,187	10,625
Per acre of land irrigated (acre-feet)	2.3	1.65	1.71	1.5	1.25

SETTLEMENT.

During 1913 there were six new homestead entries made under the reclamation act, six relinquishments, and four transfers of title.

The Great Falls Chamber of Commerce raised $5,000, which was subject to loan to the farmers under the project for the purchase of dairy stock. The farmer was to make payment for the stock from the money obtained from the sale of milk and cream. This opportunity was not utilized on account of the high rate of interest asked by the chamber of commerce and owing to the fact that the cost of insurance of the stock had to be carried by the farmer. Recently a rate of 8 per cent has been secured, and 25 dairy cows have been subscribed. A cheese factory was established at Fort Shaw on November 1, 1913: 15,000 pounds of cheese have been manufactured. Butter fat averaged 30 cents a pound.

Settlement data, Fort Shaw unit.

Item.	1912	1913	1914
1. Total number of farms on project	198	259	262
2. Population of (1)	710	1,073	1,080
3. Number of irrigated farms	176	179	181
4. Operated by owners or managers	146	141	124
5. Operated by tenants	30	38	57
6. Population of (3)	710	678	680
7. Number of towns	3	3	3
8. Population of (7)	323	395	400
9. Total population in towns and on farms	1,033	1,468	1,480
10. Number of public schools	4	4	4
11. Number of churches	1	3	3
12. Number of banks			1
13. Total capital stock [1]			
14. Total deposits [1]			
15. Total depositors [1]			
16. Number of relinquishments	4	6	3
17. Number of cancellations	5	1	5
18. Homestead entries		6	4

[1] Just started.

PRINCIPAL CROPS.

The following table of crop statistics for 1913 shows the kind of crops grown on the Sun River project. There has been a marked decrease in the acreage of wheat and an increase in that of alfalfa, as the farmers are beginning to raise more hogs and stock. Oats are still raised quite extensively, as they find a ready market.

Crop report, Sun River project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alflafa seed	69	Bushel..	39	½	$12.00	$468	$6.78
Alfalfa	1,623	Ton.....	3,707	2¼	6.00	22,242	13.70
Barley	240	Bushel..	6,166	25⅔	.70	4,316	17.98
Beets	3	Ton.....	19	6⅓	5.00	95	31.66
Flax	179	Bushel..	1,781	10	1.10	1,959	10.94
Garden	32					3,200	100.00
Millet seed	3	Bushel..	45	15	1.00	45	15.00
Oats	2,636	...do....	76,949	29½	.50	38,397	14.75
Oat hay	43	Ton.....	43	1	8.00	344	8.00
Pasture	416					4,992	12.00
Peas	5	Bushel..	100	20	.75	75	15.00
Potatoes	181	...do....	18,852	104	.75	14,139	78.10
Rye	10	...do....	100	10	.60	60	6.00
Timothy	26	Ton.....	38	1½	15.00	570	21.90
Wheat	943	Bushel..	17,837	19	.60	10,702	11.35
Wild hay	398	Ton.....	396	1	10.00	3,960	9.95
Total cropped	6,807						
Irrigated, no crop	612						
Total irrigated	7,419						
Total and average						105,564	15.15

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	9,373	179
Total irrigated area farms reported	7,419	179
Under water-right applications	7,215	176
Under rental contracts	194	3
Total cropped area farms reported	6,807	179

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Sun River project, to June 30, 1914.

ASSETS.

In fiscal agent's possession awaiting remittance	$59.58	
In other employees' hands awaiting transfer to fiscal agent	122.00	
Total		$181.58
Accounts receivable:		
Uncollected freight refunds	8,229.84	
Construction charges due and uncollected from water-right applicants	69,695.67	
Operation and maintenance charges due and uncollected from water-right applicants	7,223.73	
Total		85,149.24
Inventories:		
Mercantile stores, stock on hand	895.64	
Animals	8,273.51	
Mechanical and other equipment	70,995.09	
Materials and supplies on hand in storehouses	65,299.01	
Unadjusted transfers between projects	1,875.88	
Undistributed cost (freight and handling on inventory property)	3,443.47	
Total		150,782.60
Construction work in process:		
Gross expenditures for construction of project to date	1,543,090.03	
Less revenue earned during construction, as follows:		
Rentals of cottages	3,666.57	
Rentals of grazing lands	5,557.11	
Rentals of telephones	204.55	
Miscellaneous revenues	9,379.55	
Profits on mess houses	6,785.37	
Profits on mercantile stores	2,138.41	
Profits on hospitals	706.42	
Receipts from sale of townsites	8,407.50	
Contractors' freight refunds	9,060.26	
Adjustments:		
Depreciation on plant and equipment	10,522.77	
Loss shown on Government animals	[1] 1,346.63	
Total deductions	55,081.88	
Net expenditures for construction of project to date		1,488,008.15
Deferred operation and maintenance charges		25,851.12
Total assets		1,749,972.69

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$6,319.21	
Unpaid purchases	5,464.82	
Unpaid contract estimates	82,307.25	
Unpaid contract holdbacks	32,124.06	
Unpaid freight and express charges	9,530.79	
Unpaid passenger fares	221.20	
Unredeemed coupon books	28.46	
Unpaid miscellaneous	2,756.44	
Total		$138,752.23

[1] Deduct.

Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		$158,950.01	
Construction charges paid in advance by water-right applicants		278.63	
Construction charges paid and forfeited by water-right applicants		2,086.53	
Total			$161,315.17
Net investment:			
Disbursements	$1,543,743.92		
Transfers received from other projects	114,725.72		
		1,658,469.64	
Less:			
Collections	162,550.79		
Transfers issued to other projects	46,013.56		
		208,564.35	
Total			1,449,905.29
Total liabilities, reserves, and capital investment of the Government			1,749,972.69

Functional feature costs of Sun River project to June 30, 1914.

Development (storage) works	$641,860.76
Carriage system	431,220.41
Distribution system	201,103.63
Power system	35,108.18
Telephone lines	14,342.39
Farm unit subdivisions	4,483.24
Roads and bridges	26,723.57
Miscellaneous preliminary investigations	185,567.43
Cost ledger inventories	2,680.42
Gross expenditures for construction of project to date	1,543,090.03

Operating revenues and expenses, Sun River project, to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$127.53
Maintenance	191.32
Carriage system:	
Operation	4,002.66
Maintenance	15,224.65
Distribution system:	
Operation	9,749.23
Maintenance	29,284.18
Undistributed expenses:	
Operation	2,157.19
Maintenance	6,831.11
Total	67,567.87

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$40,793.71
Operation and maintenance charges paid in advance by water-right applicants	367.36

Operation and maintenance charges paid and forfeited by water-right applicants	$139.60
Rentals of irrigating water	349.25
Miscellaneous revenues	66.83
Deferred operation and maintenance revenues (carried to debit side of assets and liabilities statement)	25,851.12
Total	67,567.87

Estimated cost of work contemplated on Sun River project during fiscal year 1915.

Development (storage) works:		
Sun River storage	$1,000	
Pishkun Reservoir	500	
Willow Creek Reservoir	10,000	
Benton Lake Reservoir	1,000	
Sun River diversion	17,000	
Continental Divide Canal	300	
Pishkun Reservoir Supply Canal	300,000	
		$329,800
Carriage system:		
Sun River Slope Canal, Spring Valley division	300,000	
Greenfields division	100,000	
		400,000
Distribution system, Fort Shaw Canal laterals		1,000
Power system		7,000
Real estate:		
Purchase of lands	1,000	
Construction of buildings	7,000	
		8,000
Telephone lines		4,000
Farm-unit subdivision		1,000
Roads and bridges		2,500
Miscellaneous preliminary investigations, stream gauging		2,500
Operation and maintenance under public notice:		
Development	$1,000	
Carriage	4,000	
Distribution	7,000	
		12,000
Total		767,800

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

L. H. Mitchell, Project Manager, Savage, Mont.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Richland and Dawson, Mont.; McKenzie, N. Dak.

Townships: 18 to 26 N., Rs. 56 to 60 E., Montana meridian; 150 to 152 N., R. 104 W., fifth principal meridian.

Railroads: Northern Pacific, Great Northern, and Missouri River.

Railroad stations and estimated population, January 1, 1914: Intake, 75; Burns, 25; Savage, 250; Craneville, 40; Sidney, 700; Fairview, 600; Dore, 25.

WATER SUPPLY.

Source of water supply: Yellowstone River.

Area of drainage basin: 66,000 square miles.

Annual run-off in acre-feet: Yellowstone River at Glendive, Mont., 1903–1913, maximum, 13,300,000; minimum, 7,782,000; mean, 10,800,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to deliver water, season of 1914: 40,541 acres.

Area under rental contracts, season 1914: 27,737 acres.

Area under water-right applications, season 1914: 6,542 acres.

Length of irrigating season: May 15 to October 10 (148 days).

Average elevation irrigable area: 1,900 feet.

Average annual rainfall on irrigable area: 8 years, 15.93 inches; 1913, 10.57 inches. Least precipitation since 1905.

Range of temperature on irrigable area: —46° to 110° F.

Character of soil of irrigable area: Deep sandy loam predomintes; some alkali and gumbo.

Principal products: Grain, forage crops, and vegetables.

Principal markets: Minneapolis, St. Paul, and Duluth, Minn; local markets consume forage crops and vegetables.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: December 21, 1908; April 24, 1909; March 7, March 24, May 1, August 28, and November 8, 1911; March 1 and April 30, 1912; February 26, May 28, June 23, and July 21, 1913; January 19 and March 4, 1914.

Location of lands opened: Tps. 18 and 19 N., R. 57 E.; Tps. 19 and 20 N., R. 58 E.; Tps. 21, 22, 23, 24, and 25 N., R. 59 E.; and Tp. 24 N., R. 60 E., Montana principal meridian; Tps. 150 and 151 N., R. 104 W., fifth principal meridian.

Present status of irrigable area opened: 8,902 acres entered subject to the reclamation act; 1,962 acres open to entry; 1,514 acres State land; 33,273 acres private land.

Limit of area of farm unit: Public, 80 acres; private, 160 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $42.50 and $45. Rental charge for 1914, 50 cents for 1½ acre-feet per acre; additional water at the rate of 50 cents per acre-foot.

Annual operation and maintenance charge: $1.50 per acre per annum for all water-right applicants.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1903.
Construction recommended by board of engineers, April 23, 1904.
Construction authorized by Secretary, May 10, 1904.
Lower Yellowstone Dam completed February 19, 1910.
First irrigation by Reclamation Service, season of 1909.
Entire project 96 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Lower Yellowstone project provides for the diversion of water from the Yellowstone River at a point 18 miles below Glendive, Mont., into a canal on the west side of the river, which extends down the valley a distance of 67 miles to the confluence of the Yellowstone and Missouri Rivers, conveying water for the irrigation of land lying between it and the Yellowstone River. The fall of the water which will be discharged from the main canal into lateral KK at a point 19 miles below the head gates will be utilized to operate turbines direct connected to centrifugal pumps for raising water to irrigate approximately 3,000 acres of excellent bench land. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The completed features are the Lower Yellowstone Dam and diversion works; the main canal for a distance of 66.3 miles and the complete lateral system in connection therewith. Sublaterals and extensions of a few main laterals will be constructed as the needs of water users require.

The features for future construction are the pumping plant, and about 52 miles of laterals which, when completed, will irrigate approximately 16,450 acres.

CONSTRUCTION DURING THE FISCAL YEAR.

The laterals were extended 11.1 miles, and 3.7 miles of waste-water ditches and open drains were dug, of which 2 miles were on drainage line No. 1. Twenty-three wooden bridges, 3 concrete culverts, 14 terra cotta pipe culverts, 17 wooden culverts, and 1 wooden flume were constructed. Most of these structures were under the main canal and lateral extensions. Five hundred yards of rock were placed below the dam and an equal amount was quarried and placed on the south side of the river for future use.

OPERATION AND MAINTENANCE.

During the season of 1913, from June 7 to October 10, 7,660 acres were irrigated, 6,631 being in Montana and 1,029 in North Dakota, and comprising 158 farms, of which 136 were in Montana and 22 in North Dakota.

The small amount of irrigation during 1913 can be attributed to the general fault, on the Lower Yellowstone project, of water users not irrigating, in the expectation that rains would supply sufficient moisture. However, exceptionally warm, dry winds and lack of moisture destroyed many crops.

Historical review, Lower Yellowstone project.

Item.	1909	1910	1911	1912	1913	1914 to June 30.
Acreage for which service was prepared to supply water	40,133	40,133	37,867	37,880	37,799	40,541
Acreage irrigated	7,113	8,655	15,445	5,068	7,660	2,420
Miles of canal operated	110	118	158	125.5	133	133
Water diverted (acre-feet)	56,028	51,142	52,542	15,404	30,088	8,757
Water delivered to land (acre-feet)	5,120	12,485	21,799	6,058	10,250	2,160
Per acre of land irrigated (acre-feet)	0.72	1.44	1.41	1.19	1.34	0.89

SETTLEMENT.

At the present time 14 homesteads are open to entry. During the fiscal year there have been 5 entries, 2 relinquishments, 7 assignments, and 21 private holdings transferred.

During the fiscal year the following cooperative organizations were established:

Farmers' Cooperative Elevator Co., Fairview, Mont.
Farmers' Mercantile & Elevator Co., Sidney, Mont.
Farmers' Elevator Co., Fairview, Mont.
Farmers' Elevator Co., Dore, N. Dak.

It is estimated that 50 per cent of the present settlers can be considered as permanent. There is room on the Lower Yellowstone project for four times the present number of actual settlers.

The Great Northern Railway laid the steel from Fairview to Sidney, and during the latter part of 1913 were operating daily passenger trains.

Settlement data, Lower Yellowstone project.

Item.	1913	1914
Total number of irrigable farms on project	456	512
Population of above	600	700
Number of irrigated farms	158	[1] 94
Irrigable farms operated by owners	[2] 191	[3] 223
Irrigable farms operated by tenants	[2] 21	[3] 20
Irrigable farms with neither owners nor tenants on same	[2] 136	[3] 73
Number of towns	7	8
Population of above	1,125	1,750
Total population in towns and on farms	1,725	2,450
Number of public schools	15	16
Number of churches	4	4
Number of banks	7	9
Total capital stock	$200,000	$260,000
Total number of deposits		$715,000
Total number of depositors		3,600
Number of relinquishments	2	2

[1] To June 30, 1914. [2] Covered by water-right applications. [3] Covered by rental contracts.

PRINCIPAL CROPS.

Though grains still occupy the major portion of the cultivated lands, there is in progress a rapid transition toward crops more beneficial to the soil and adapted to stock raising. The crop of alfalfa has doubled each year since 1911, and at the end of 1914 it is estimated that there will be 4,000 acres in this crop.

The first of the following tables shows the crop results on lands irrigated by the Government system during 1913, and the other table gives similar figures for unirrigated lands within the project during the same year. It is notable that the irrigated lands gave an average return per acre nearly twice that obtained on the dry-farmed areas. The same crops were grown in each case, with substantially higher yields from the irrigated lands.

Crop report, irrigated lands, Lower Yellowstone project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	1,407	Ton	3,231	2.3	$9.74	$31,462	$22.36
Barley	1,027	Bushel	23,140	22.5	.46	10,589	10.31
Flax	282	do	2,870	10.2	1.19	3,420	12.13
Garden	28					2,225	79.47
Hay, native	150	Ton	150	1.0	9.08	1,362	9.08
Oats	1,160	Bushel	36,393	31.4	.26	9,400	8.10
Pasture	97					227	2.34
Potatoes	41	Bushel	4,617	112.6	.67	3,117	76.02
Wheat	3,136	do	55,084	17.6	.70	38,581	12.30
Miscellaneous	82					1,204	14.68
Total cropped	7,410						
Total and average						101,587	13.71
Irrigated, no crop	250						
Total irrigated	7,660						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	14,321	158
Total irrigated area farms reported	7,660	158
Under water-right applications	7,660	158
Total cropped area farms reported	7,410	158

Crop report, unirrigated lands, Lower Yellowstone project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	973	Ton	830	0.9	$9.75	$8,094	$8.32
Barley	1,442	Bushel	24,147	16.7	.45	10,969	7.61
Flax	1,053	do	5,982	5.7	1.19	7,128	6.77
Garden	12					504	42.00
Hay, native	423	Ton	485	1.1	8.74	4,240	10.02
Oats	1,551	Bushel	41,839	27.0	.26	10,660	6.87
Potatoes	69	do	4,664	67.6	.71	3,320	48.11
Pasture	1,628					5,075	3.12
Wheat	5,307	Bushel	54,965	10.3	.70	38,256	7.21
Miscellaneous	218					2,742	12.58
Total cropped	12,676						
Total and average						90,988	7.18

ORDER DATED MARCH 4, 1914.

Whereas the public notice issued December 21, 1908, opening to irrigation lands under the Lower Yellowstone project, Montana-North Dakota, required payment to be made in 10 equal annual installments and it was later found necessary to grant a stay of proceedings looking to cancellation for failure to make the payments when due; and

Whereas, on March 1, 1912, public notice was issued granting an extension of time for payment of the first installment and permitting repayment of the building charge to be made to the United States in

graduated annual installments, the total building charge being increased from $42.50 to $45 per acre; and

Whereas, notwithstanding the allowance of such stay of proceedings, extension of time, and better terms of payment, a large number of the water users are delinquent in payments, and their water-right applications subject to cancellation:

Now, therefore, in pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, it is hereby ordered:

1. All entrymen and water-right applicants who find themselves unable to meet the conditions of public notices heretofore issued and also others having irrigable lands for which public notice has not yet been issued, may, by acceptance of the provisions of this order, obtain a supply of water for the irrigation of their lands in the season of 1914 and thereafter, until further notice, on a rental basis of 50 cents per irrigable acre, for the irrigation season, payment thereof to become due December 1, after the close of the irrigation season. Such acceptance will entitle a water user to not to exceed 1.5 acre-feet per acre of irrigable land; and additional water may, if required for the proper irrigation of the land, be obtained at the rate of 50 cents per acre-foot; and payment therefor shall likewise become due December 1 of the year in which the water was furnished. All amounts not paid when due shall bear interest at the rate of 10 per cent per annum until paid. No water shall be furnished in any year until full payment of rental charges and interest for the preceding year or years have been paid.

2. All entrymen or water-right applicants who shall on or before May 1, 1914, file with the project manager, Savage, Mont., a written acceptance of the terms and conditions of this order upon the form hereto attached, and comply with the cultivation requirements thereof, shall thereby secure a stay of proceedings looking to the cancellation of their entries or water-right applications for failure to make payments when due, such stay of proceedings to remain in effect until further announcement by public notice or otherwise.

3. The acceptance of the terms of this order shall be subject to the provisions of such public notices and orders as may be hereafter issued affecting such lands; but nothing herein contained shall prevent any water user from securing the benefits of any laws which may be hereafter enacted affecting the operations under the reclamation law.

4. All entrymen and water-right applicants who are now in good standing in the matter of payments of water-right charges and all those who on or before May 1, 1914, shall make the necessary payments thereunder may, if they so desire, continue under present contracts and public notices and orders theretofore issued.

FRANKLIN K. LANE,
Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Lower Yellowstone project, to June 30, 1914.

Accounts receivable:			
Uncollected miscellaneous items		$57.50	
Construction charges due and uncollected from water-right applicants		43,988.47	
Operation and maintenance charges due and uncollected from water-right applicants		127,344.76	
Total			$171,390.73
Inventories:			
Animals		3,147.23	
Mechanical and other equipment		28,594.83	
Material and supplies on hand in storehouses		3,272.50	
Undistributed cost (freight and handling on inventory property)		483.01	
Total			35,497.57
Construction work in process:			
Gross expenditures for construction of project to date		2,855,970.17	
Less revenue earned during construction, as follows—			
Rentals of cottages	$4,201.89		
Rentals of telephones	4,831.01		
Loss on messhouses	[1] 6,441.24		
Profits on mercantile stores	640.33		
Profits on hospital	392.44		
Contractors' freight refunds	21,261.33		
Adjustments—			
Profits shown on Government animals	2,961.08		
Total deductions		27,846.84	
Net expenditures for construction of project to date			2,828,123.33
Deferred operation and maintenance charges			247,554.77
Total assets			3,282,566.40

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$3,868.92	
Unpaid purchases	1,443.03	
Unpaid contract holdbacks	13,832.11	
Unpaid freight and express	2,198.43	
Unpaid passenger fares	31.15	
Unpaid agreement to purchase real estate	932.00	
Unpaid miscellaneous	11,927.68	
Total		$34,233.32
Reserves for repayment to reclamation fund of cost of project:		
Construction charges accrued on contracts with water-right applicants	51,425.07	
Construction charges paid in advance by water-right applicants	26,138.95	
Construction charges paid and forfeited by water-right applicants	255.00	
Total	77,819.02	

[1] Deduct.

Net investment:		
Disbursements	$3,216,493.41	
Transfers received from other projects	98,147.51	
		$3,314,640.92
Less—		
Collections	112,269.21	
Transfers issued to other projects	31,857.65	
		144,126.86
Total		$3,170,514.06
Total liabilities, reserves, and capital investment of the Government		3,282,566.40

Functional feature costs of Lower Yellowstone project to June 30, 1914.

Development (storage) works	$334,070.77
Carriage system	2,018,267.14
Distribution system	267,715.19
Drainage and measuring weirs (supplemental construction)	39,788.27
Real estate	29,624.99
Telephone lines	23,871.24
Farm unit subdivision	15,456.47
Roads and bridges	76,395.92
Miscellaneous preliminary investigations	50,780.18
Gross expenditures for construction of project to date	2,855,970.17

Operating revenues and expenses, Lower Yellowstone project, to June 30, 1914.

EXPENSES.

Development (storage) works, maintenance	$91,549.51
Carriage system:	
Operation	22,029.07
Maintenance	112,257.17
Distributing system:	
Operation	13,040.82
Maintenance	86,632.82
Undistributed expenses:	
Operation	14,393.16
Maintenance	70,825.92
Total	410,728.47

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$162,660.70
Operation and maintenance charges paid in advance by water-right applicants	380.00
Operation and maintenance charges paid and forfeited by water-right applicants	95.50
Rentals of lands and buildings	25.00
Rentals of irrigation water	12.50
Deferred operation and maintenance revenues (carried to debit side of assets and liability statement)	247,554.77
Total	410,728.47

Estimated cost of contemplated work, Lower Yellowstone project, during fiscal year, 1915.

Carriage system, structures, main canal extension		$500
Distribution system, structures, lateral system extension		500
Drainage and measuring weirs (supplemental construction):		
Drainage system	$30,000	
Measuring weirs	550	
		30,550
Real estate, rights and property		600
Farm unit subdivisions, land survey		1,500
Operation and maintenance under public notice		50,000
Total		83,650

NEBRASKA, PLATTE RIVER RECONNOISSANCE.

Claim has been made by the people living along the Platte River in Nebraska that sufficient water was available in that stream during the winter and spring months for the irrigation by direct diversion into canals of a considerable area of land in Gosper, Phelps, and Kearney Counties, Nebr. The Secretary accordingly approved orders for a preliminary survey and investigation to determine the feasibility and approximate cost of the necessary irrigation works, and on February 28, 1914, the comptroller approved an expenditure of $10,000, or such part thereof as may be necessary, for a preliminary investigation. Mr. Charles T. Pease, engineer, was assigned to this work, and has been in the field with a survey party since June 18 making a reconnoissance to ascertain the probable amount of water available, the area of land to which it could be applied, and the approximate cost of construction of a flood-water canal for this purpose. This reconnoissance is not yet completed. The proposed canal contemplates the diversion of water from the Platte River at a point about 5 miles west of Lexington, Nebr., it being the plan to construct a diversion dam in the river at this point and carry the water directly to the lands to be irrigated through a large flood-water canal. No authentic data are available as to the amount of water or the probable cost. The lands under consideration for irrigation are on the divide between the Platte and Republican Rivers in the vicinity of Holdrege and Minden, Nebr., and are all excellent farming lands, but located in that region where the shortage of rainfall in many years is damaging to growing crops.

This investigation is being made in cooperation with D. D. Price, State engineer, and G. E. Condra, president of the Nebraska Conservation Commission.

FINANCIAL STATEMENTS.

The assets and liabilities are shown in the financial statement for the secondary projects. The costs are given in the functional feature cost report which follows the above statement, and the net investment is given in Tables 11 and 12 in the appendix.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

ANDREW WEISS, project manager, Mitchell, Nebr.; PAUL ROTHI, irrigation manager.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION AND CLIMATIC CONDITIONS.

Counties: Sioux, Scotts Bluff, Banner, and Morrill, Nebr.; Natrona, Carbon, Converse, Goshen, and Platte, Wyo.

Townships: 19 to 27 N., Rs. 48 to 67 W.; 26 to 30 N., Rs. 83 to 85 W., sixth principal meridian.

Railroads: Chicago, Burlington & Quincy; Union Pacific; Chicago & Northwestern; Colorado & Southern.

Railroad stations and estimated population, January 1, 1914: Bridgeport, 600; Bayard, 325; Minatare, 550; Scottsbluff, 2,500; Mitchell, 750; Morrill, 400; and Henry, Nebr., 75; Torrington, 300; Vaughn; Lingle, 75; Barnes; Fort Laramie; Whalen; Guernsey, 300; and Casper, Wyo., 3,400.

WATER SUPPLY.

Source of water supply: North Platte River.

Area of drainage basin: 12,000 square miles.

Annual run-off in acre feet of North Platte River: At Pathfinder, Wyo. (12,000 square miles), 1905 to 1913—Maximum, 2,420,000; minimum, 870,000; mean, 1,425,000. At Guernsey or Whalen, Wyo. (16,200 square miles), 1900 to 1913—Maximum, 2,690,000; minimum, 983,000; mean, 1,602,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

INTERSTATE UNIT.

Area for which the service is prepared to supply water, season of 1914, 109,500 acres.

Area under water-right applications and rental contracts, season of 1914, 95,185 acres.

Length of irrigating season: From April 1 to September 30—183 days.

Average elevation of irrigable area: 4,100 feet above sea level.

Average annual rainfall on irrigable area: 5 years, 13.77 inches; 1913, 16.08 inches. Comparatively wet.

Range of temperature on irrigable area: —25° to 104° F.

Character of soil of irrigable area: Sandy loam.

Principal products: Alfalfa, cereals, corn, sugar beets, potatoes.

Principal markets: Omaha, Nebr.; Kansas City and St. Joseph, Mo.; Denver, Colo.; central Wyoming.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: July 29, 1907; May 29, June 16, November 12, 1908; March 3, March 27, June 2, 1909; March 12, April 4, June 6, June 25, July 2, September 10, 1910; March 7, March 24, April 21, December 30, 1911; March 13, March 14, March 19, May 23, June 24, September 5, 1912; February 5, March 11 (2), March 29, June 16, June 23, July 13, September 4, 1913.

Location of lands opened: Ts. 22 to 26 N., Rs. 52 to 65 W., sixth principal meridian.

Present status of irrigable lands opened: 61,055 acres entered subject to the reclamation act; 5,543 acres open to entry; 371 acres withdrawn from entry; 9,998 acres of State lands (including 2,179 acres of Carey Act lands); 32,904 acres in private ownership (including 12,289 acres of Carey Act lands).

Limit of area of farm units: Public, 80 acres; private, 160 acres.
Duty of water: Two and one-half acre-feet per acre per annum at the farm.
Charges per acre of irrigable land: Building, $45 and $55; annual operation and maintenance charge, $1.10 per acre.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.
Construction recommended by director March 7, 1903.
Construction conditionally authorized by Secretary March 14, 1903.
First irrigation by Reclamation Service, season of 1908.
Whalen Diversion Dam completed February, 1909.
Pathfinder Dam completed June, 1909.
Pathfinder Dike completed May, 1911.
Interstate Canal, 165 miles completed June 30, 1914.
Entire project, comprising storage and interstate units, 91 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the North Platte project provides for the storage of flood waters of North Platte River in a reservoir controlled by the Pathfinder Dam, about 3 miles below the junction of the North Platte and Sweetwater Rivers and 50 miles southwest of Casper, Wyo., and in smaller reservoirs along the canal lines; and the diversion of water from North Platte River by a dam near Whalen, Wyo., into the Interstate Canal, supplying water for lands on the north side of the river and into the Fort Laramie Canal, watering lands on the south side of the river. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The completed features are: Pathfinder Dam and Dike, Whalen Diversion Dam, the first two divisions of the Interstate Canal, lateral systems of districts 1 and 2 of the Interstate Canal system, Reservoir No. 1, known as Lake Alice. Construction is in progress upon Reservoir No. 3, known as Lake Minatare, the third division of the Interstate Canal, and the third lateral district. The Fort Laramie Canal system, covering approximately 107,000 acres, remains for future construction.

CONSTRUCTION DURING FISCAL YEAR.

Pathfinder Reservoir.—A small turbine pumping plant is being installed to facilitate the closing of the balanced valves.

Interstate Canal.—Work has continued on the Low Line Canal and lateral system and is 87 per cent completed. The earth excavation was nearly all done by contract and the construction of cross-drainage structures, lateral headgates, road crossings, and lateral structures by Government forces. It is expected that practically all the construction work in connection with the Low Line Canal and lateral system will be completed by the end of the calendar year as far as the work has been authorized.

Supplementary storage.—In the development of the third lateral district it is necessary to provide supplementary storage reservoirs. There are three available reservoir sites, Nos. 1, 2, and 3, with capacities of 11,400, 27,000, and 67,000 acre-feet, respectively. Reservoir No. 1 is often referred to as Lake Alice and Reservoir No. 3 is known as Lake Minatare. Dams No. 1 and No. 1½, at Lake Alice, have been completed. Construction work began on Dam No. 3 at Lake Minatare in June, 1912. The construction of this dam involves the handling of about 630,000 cubic yards of earth fill, 157,000 cubic yards of gravelly material, 14,000 cubic yards of unscreened gravel, 14,000 cubic yards of brule clay excavation, and 16,000 cubic yards of

concrete. The progress has been all that could be desired since the opening of the present working season, the contractor having sublet practically all of the earth and concrete work to subcontractors, who are well qualified for their respective undertakings. At the end of the fiscal year the cut-off trench was practically completed; likewise the excavation for the outlet channel and the concrete work in connection with the outlet conduit. The earth excavation for the embankment was about 60 per cent completed and the gravel portion about 67 per cent completed, or average percentage of completion of the embankment, without paving, 61 per cent. The paving of the dam embankment is about 31 per cent completed. All that portion of the cut-off wall west of the outlet conduit has been built and back filled, and the foundation for the portion of the cut-off wall east of the outlet conduit, about 1,400 feet in length, is open and being considered. The whole contract is about 64 per cent complete.

DRAINAGE.

The necessary surveys and investigations incident to the planning and construction of drainage works were continued during the year. These investigations include borings over the affected areas and tracts likely to become seeped, to determine the subsoil conditions, the elevation, and periodic variation of the water table, and other factors bearing upon the location and construction of the drainage works. In addition to investigations over areas where seepage has already threatened, investigations have been carried on over the Dutch Flats in order to determine the rise in ground water. Over these flats the water table is not yet sufficiently near the surface to interfere with the irrigability of the lands. The investigations show, however, that it is steadily rising year by year and it is probable that within a comparatively short time drainage works will be necessary.

During the year the open trench on the main line of the Hiersche drain was completed with the drag-line excavator. The total length of this drain is 22,700 feet and the total material excavated in its construction during the past two years is 66,108 cubic yards. The Dunham drain was also completed, 15,120 feet of 12-inch tile and 910 feet of 15-inch tile being placed during the year. In addition, 4,050 linear feet of open trench were excavated at the lower end. This makes a total of 4,050 linear feet of open and 23,500 feet of closed drain on this system. In addition to the above some repairs were made and tile replaced in portions of the Banner and McAllister drains. Concrete diversion structures and ditches were built to deliver the seepage waters from a number of cross-ditches into the Tri-State Canal. These include Sheep Creek, Akers Draw, Dry Spotted-tail, and Tub Springs.

The drainage of certain portions of the project has presented somewhat difficult problems on account of the large quantities of water which are reaching them through the subsoil of impervious brule clay. It has been impossible to determine in many cases the source of supply of this water, but there are strong probabilities that in some instances it is the result of seepage losses from main canals and laterals located at long distances from the lands affected. An attempt is being made wherever practicable to locate the drains in this brule clay and in such positions as to intercept the water before it reaches

the irrigable lands, although it is sometimes impossible to do this on account of the great depth of the soil overlying the clay on some of the affected areas.

The drains so far constructed have discharged large quantities of water and have been effective in a large degree in preventing the spread of seepage. Over certain areas, where the water table rises very rapidly during the latter part of the irrigation season sufficient drains have not yet been constructed to intercept the total quantity of water which reaches the irrigable lands, and additional work on these may be required.

It is of the utmost importance in locating drains to determine the direction of the underground flow of percolation, and to place the drains in the pervious strata through which this underground flow takes place. To this end studies and investigations are now being carried on.

OPERATION AND MAINTENANCE.

The system as operated during the past season consisted of the Pathfinder Dam and Reservoir, the Whalen diversion dam, 95 miles of main canal, supplemental storage reservoir No. 1, 4.6 miles of reservoir supply canal, 37 miles of high line canal, and 511 miles of laterals. Water to the amount of 141,489 acre-feet was delivered to 908 farms, exclusive of the land of the North Platte Canal & Colonization Co., to which 25,027 acre-feet of water were delivered for the irrigation of 75 farms. The average amount of water used upon the land under the interstate unit was 2.49 acre-feet, and on the land of the North Platte Canal & Colonization Co. 3.95 acre-feet. The total diversion at the Whalen Dam during the irrigation season of 1913 was 297,045 acre-feet. During the first part of the season of 1914, 77,097 acres of land were entitled to water under water-right applications, 241 acres under rental contracts, and 17,837 acres under contract with the North Platte Canal & Colonization Co. Of this amount approximately 65,000 acres were in cultivation under the different arrangements. Water was diverted into the main canal on May 5, 1914, the maximum diversion to June 30 being 1,430 second-feet. Dry weather has made it necessary to make use of the rotation system of water delivery for nearly the entire period. Water is now being delivered to water users for 4 days followed by a period of nondelivery for 4 days. On June 30 the storage in the Pathfinder Reservoir was 1,082,200 acre-feet, the maximum to that date being 1,093,000, at which time the water was running over the spillway with a depth of 1.03 feet.

Historical review, North Platte project.

Item.	1909	1910	1911	1912	1913	1914
Acreage for which service was prepared to supply water	87,468	87,994	96,898	103,837	109,272	109,500
Acreage irrigated	[1] 41,214	[1] 48,537	[1] 49,411	[1] 55,631	[1] 63,366	[1] 65,000
Miles of canal operated	467	487	534	602	648	648
Water delivered to land (acre-feet)	[2] 109,166	[2] 166,238	[2] 190,427	[2] 113,251	[2] 141,489	.....
Per acre of land irrigated (acre-feet)	[2] 3.17	[2] 3.93	[2] 4.26	[2] 2.25	[2] 2.49	.....

[1] Includes acreage in crops on North Platte Canal & Colonization Co. lands.
[2] Exclusive of lands under North Platte Canal & Colonization Co. tract.

SETTLEMENT.

Conditions on the project have not changed materially during the past fiscal year. The number of transfers of property has been somewhat less than formerly, due partly to the increasing permanency of the class of settlers and also to the fact that many have been waiting for a change in the reclamation law before making transfers. A number of farm units which have been canceled from time to time for the nonpayment of water-right charges and other causes have been taken up by new entrymen, who appear to be permanent settlers. A large number of them are of foreign descent and are hard-working and industrious people. The comparatively large payment of water-right charges required at the time of filing upon land tends to keep out the speculative entrymen. There are very few organizations upon the project for cooperative purchase or sale of materials or products. An organization was established during the year for bettering conditions of handling alfalfa hay and succeeded in getting a more equitable freight rate for hay shipped from the valley. A cooperative association was formed in Mitchell for the sale of lumber and materials but did not prove a success, and their yard was sold to one of the lumber companies of the valley. At the present time the question of forming associations for the purchase of live stock and for the protection of live stock against disease is under agitation. Hog cholera has appeared in the valley to some extent, and an organization was formed a short time ago among the farmers of Scotts Bluff County for the protection of the hog-raising industry. The Department of Agriculture is cooperating with the settlers in the valley to exterminate the disease and in general to improve the condition of the hog industry. It is expected that further work in this line will be taken up, extending its operations into other branches of stock raising. The following table shows settlement data for the project for 1912, 1913, and 1914. The territory covered by this table is for the lands irrigated by the Reclamation Service only and extends from the east end of the approved project in range 51, in Nebraska, to as far west as Torrington, in Wyoming.

Settlement data, North Platte project.

Item.	1912	1913	1914
1. Total number of farms on project	1,270	1,270	[2] 1,270
2. Population of (1)	2,504	2,774	[2] 2,900
3. Number of irrigated farms	777	908	[2] 950
4. Operated by owners or managers	575	603	[2] 475
5. Operated by tenants	202	305	[2] 475
6. Population of (3)	[1]	[1]	[1]
7. Number of towns	7	7	7
8. Population of (7)	4,600	4,762	[2] 4,900
9. Total population in towns and on farms, sum of (2) and (8)	7,104	7,536	[2] 7,800
10. Number of public schools	24	30	[2] 30
11. Number of churches	25	25	[2] 25
12. Number of banks	13	13	[2] 13
13. Total capital stock	$277,000	$277,000	$277,000
14. Total amount of deposits	[1]	$1,160,000	$1,704,000
15. Total number of depositors			
16. Number of relinquishments	5	10	
17. Number of cancellations	14	8	

[1] Data not available.

[2] Estimated.

PRINCIPAL CROPS.

The acreage under crops has been increasing on the project each year, both by the addition of new land and by the farmers developing their units and putting more land into cultivation. The increase from 1913 to 1914 is not large, as practically no new lands have been opened to irrigation during the past fiscal year. The proportion of land planted to alfalfa has been increasing each year. The same is true of sugar beets. In 1909 only 1 per cent of the cropped area was in alfalfa, while in 1914 this crop represented 57 per cent of the acreage. In 1909, 2 per cent of the land was in sugar beets, and in 1894, 9 per cent. The percentage of all the other crops has gradually decreased since the opening of the project. This is especially noticeable in the case of small grains. In 1909, 73 per cent of the land was in small grains and corn. In 1914 only 27 per cent is planted to these crops. The total value of the crop on the project for 1913 was $786,621, as compared with $521,455 in 1912. About 65,000 acres are in crop this year on the Interstate project and on the North Platte Canal & Colonization Co.'s lands. Adverse weather conditions during the latter part of June destroyed or injured a considerable amount of crops, but it is expected that in spite of this there will be satisfactory returns.

Crop report, North Platte project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit. of yield.	Total.	Per acre.
Alfalfa hay	27,298	Ton	61,728	2.3	$5.00	$308,640	$11.31
Alfalfa seed	2,946	Bushel	3,108	1.1	8.00	24,864	8.44
Barley	2,331	do	49,522	21.0	.60	29,713	12.75
Corn	3,561	do	67,001	19.0	.70	46,901	13.17
Oats	8,590	do	211,599	25.0	.40	84,640	9.45
Potatoes	1,156	do	151,304	131.0	.45	68,087	58.90
Rye	928	do	6,273	7.0	.45	2,823	3.04
Sugar beets	2,920	Ton	32,739	11.0	5.50	180,065	61.67
Wheat	2,182	Bushel	32,489	15.0	.63	20,468	9.38
Pasture	1,200					9,600	8.00
Forage[1]	894					5,108	5.72
Garden[1]	300					5,712	29.04
Total cropped	54,306						
Total and average						786,621	14.40
Irrigated, no crop:							
Alfalfa seeded, nurse crop.	6,769						
Alfalfa seeded, no nurse crop.	2,523						
Less duplicated areas	6,769						
Total	2,523						
Total irrigated	56,829						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	72,289	908
Total irrigated area farms reported	56,829	908
Under water-right applications	56,460	904
Under rental contracts	369	4
Total cropped area farms reported	54,306	908

[1] Under forage is included cane, corn fodder, stock beets, miscellaneous grains, millet and other hay. Under garden is included beans.

FORT LARAMIE CANAL.

The form of trust deed which was prepared for execution by owners of deeded lands in accordance with the recommendation of the consulting board of May 3, 1912, was revised to overcome certain legal obstacles. The Fort Laramie & Gering Water Users' Association was organized in the latter part of 1913. The officers of the association and other friends of the project have been active in securing the signatures of deeded landowners to the trust deeds. At the present time this campaign is still in progress, and will probably continue for some time, since many of the landowners are nonresidents and difficult to reach.

SALE OF SUPPLEMENTAL STORAGE RIGHTS FROM PATHFINDER RESERVOIR TO PRIVATE CANALS.

Following the plan mentioned in the eleventh annual report, contracts were entered into with six canal companies or districts in Nebraska for the sale of supplemental storage rights from Pathfinder Reservoir. No further sale contracts have been entered into within the last fiscal year, although several companies and districts are contemplating such purchase as soon as they can overcome legal and other obstacles. Several of these organizations have entered into temporary rental agreements.

A gauging station equipped with an automatic recording instrument has been established on the North Platte River above the Pathfinder Reservoir, and gaugings are also being made of the inflow of Sweetwater River by the United States Geological Survey. A competent hydrographer has been making river measurements and records between the Pathfinder Reservoir and Bridgeport, Nebr., to ascertain the conditions of inflow from the tributaries, losses in transmission, and such other data as may be essential in a determination of water rights and proper water distribution.

ORDER DATED JULY 15, 1913.

In view of the exceptional requirements regarding operation and maintenance payments during the current year on the North Platte project, Wyoming-Nebraska, constructed under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), due to the postponement of payments in former years, it is hereby ordered that as a condition of the delivery of water during the current irrigation season without immediate payment of the charges due for operation and maintenance, there shall be an increase to said charges for operation and maintenance of 1 cent per acre for each month which elapses in whole or in part from July 21, 1913, to the date of payment. Such additional charge shall be separately added to each portion of an installment for operation and maintenance remaining unpaid on and after July 21, 1913. That is to say, those who owe portions of installments for operation and maintenance for two years shall be required to add the amount of 2 cents per acre per month or fraction of a month.

FRANKLIN K. LANE.

PUBLIC NOTICE DATED SEPTEMBER 4, 1913.

1. In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, notice is hereby given that water will be furnished under the North Platte project, Nebraska-Wyoming, in the irrigation season of 1913 and thereafter for the irrigable lands shown upon farm-unit plat of T. 25 N., R. 62 W., approved June 3, 1913, on file at the local land office at Cheyenne, Wyo., subject to the public notice of March 14, 1912, and all notices and orders amendatory thereof or supplementary thereto as modified by the following terms and conditions.

2. The water users will be required to construct and maintain their own distributing system; to have the water for their respective tracts, measured and delivered at such headgate located, constructed, and maintained by the United States in the Interstate Canal as may be designated by the United States; that there shall be allowed to the said lands on account of the water users constructing their own distributing system a credit of $20 per irrigable acre on the building charge of $55 per irrigable acre, the rate in effect for other lands under the project as fixed by public notice of December 30, 1911.

3. The charges per irrigable acre for said lands are divided into two parts, as follows: At (*a*) for the building of the irrigation system $35 per acre of irrigable land, payable in not more than 10 annual installments, as follows:

First	$1
Second	2
Third	3
Fourth	3
Fifth	3
Sixth	4
Seventh	4
Eighth	4
Ninth	5
Tenth	6
Total	35

and (*b*) for operation and maintenance, which shall be the pro rata share of said lands for the cost of operation and maintenance of said project, exclusive of the distributing system of the project, the latter being fixed at one-half of the cost of operation and maintenance of the said project, so that the portions of installments for operation and maintenance for these lands shall be one-half of the cost of operation and maintenance of the project, as fixed by public notices now in effect, or hereafter issued, and shall be paid as in said public notices and orders specified.

4. The first installment of the charges for building, operation, and maintenance shall accompany the filing of water right application; the second installment shall be due on December 1 of the next calendar year, and subsequent installments shall become due, respectively, on December 1 of each calendar year thereafter. No water will be furnished in any season until payment of the portions of the installments on account of operation and maintenance then due.

A. A. JONES,
Acting Secretary of the Interior.

Assets, liabilities, reserves, and capital, North Platte project, to June 30, 1914.

ASSETS.

Accounts receivable:			
Construction charges due and uncollected from water-right applicants		$319,428.25	
Operation and maintenance charges due and uncollected from water-right applicants		79,301.40	
Total			$398,729.65
Inventories:			
Animals		15,606.32	
Mechanical and other equipment		40,655.22	
Material and supplies on hand in storehouses		70,115.78	
Goods in transit		46.72	
Undistributed cost (freight and handling on inventory property)		134.11	
Total			126,558.15
Construction work in process:			
Gross expenditures for construction of project to date		6,338,964.75	
Less revenue earned during construction, as follows:			
Rentals of cottages	$3,384.42		
Rentals of grazing lands	4,473.66		
Rentals of irrigation water	14,283.20		
Miscellaneous revenues	1,353.28		
Loss on mess houses	[1] 9,990.32		
Profits on mercantile stores	4,761.39		
Profits on hospitals	5,677.93		
Contractor's freight refunds	14,737.43		
Forfeitures by default bidders and contractors	16,255.00		
Adjustments:			
Depreciation on plant and equipment	1,674.14		
Loss shown on Government animals	[1] 1,204.07		
Total deductions		55,406.06	
Net expenditures for construction of project to date			6,283,558.69
Total assets			6,808,846.49

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$10,715.37	
Unpaid purchases	17,808.24	
Unpaid contract estimates	25,220.63	
Unpaid contract holdbacks	27,261.30	
Unpaid freight and express charges	13,361.26	
Unpaid passenger fares	127.98	
Unredeemed coupon books	26.55	
Unredeemed meal tickets	.25	
Unpaid miscellaneous	22.94	
Total		$94,544.52

[1] Deduct.

Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		$493,009.43	
Construction charges paid in advance by water-right applicants		4,016.30	
Construction charges paid and forfeited by water-right applicants		4,652.90	
Total			$501,678.63
Net investment:			
Disbursements	$6,071,027.80		
Transfers received from other projects	633,597.96		
		6,704,625.76	
Less:			
Collections	519,505.11		
Transfers issued to other projects	19,037.53		
		538,542.64	
Total			6,166,083.12
Revenues in excess cost of operation and maintenance			46,540.22
Total liabilities, reserves, and capital investment of the Government			6,808,846.49

Functional feature costs of North Platte project to June 30, 1914.

Development (storage) works	$2,579,687.56
Carriage system	2,231,859.79
Distribution system	881,000.83
Drainage and flood-protection system	84,589.00
Real estate	19,777.18
Farm-unit subdivisions	42,108.85
Miscellaneous preliminary investigations	76,641.16
Operation and maintenance during construction	423,300.38
Gross expenditures for construction of project to date	6,338,964.75

Operating revenues and expenses North Platte project to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$12,298.17
Maintenance	2,644.20
Carriage system:	
Operation	53,232.12
Maintenance	92,196.62
Distribution system:	
Operation	87,653.53
Maintenance	52,170.03
Drainage and flood-protection system, maintenance	646.67
Revenues in excess of cost of operation and maintenance (carried to credit side of assets and liabilities statement)	46,540.22
Total	347,381.56

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$342,886.22
Operation and maintenance charges paid in advance by water-right applicants	390.39

Operation and maintenance charges paid and forfeited by water-right applicants	$979.95
Rentals of irrigation water	2,940.75
Miscellaneous revenues	184.25
Total	347,381.56

Estimated cost of contemplated works North Platte project during fiscal year 1915.

Development (storage) works:		
Pathfinder Reservoir	$5,300	
Lake Alice Reservoir	8,000	
Dam No. 3	226,505	
Winters Creek Lake	21,940	
Gatekeeper's cottage	1,720	
		$263,465
Carriage system:		
First division main canal	28,000	
Third division main canal	82,017	
		110,017
Distribution system:		
First lateral district	7,356	
Second lateral district	6,975	
Third lateral district	74,506	
Right of way	5,683	
		94,520
Drainage system		78,700
Operation and maintenance during construction		13,750
Operation and maintenance (public notice)		106,000
Total		666,452

NEVADA, TRUCKEE-CARSON PROJECT.

D. W. Cole, project manager, Fallon, Nev.; F. H. Tillinghast, engineer, Lahontan Dam, Lahontan.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Churchill, Storey, and Lyon.
Townships: 17 and 18 N., Rs. 17 to 30 E.; 19 N., Rs. 26 to 31 E.; 20 N., Rs. 22 to 31 E., Mount Diablo meridian.
Railroad: Southern Pacific.
Railroad stations and estimated population January 1, 1914: Fernley, 50; Hazen, 150; Fallon, 1,000; and Lahontan, 350.

WATER SUPPLY.

Source of water supply: Truckee and Carson Rivers.
Area of drainage basin: 3,450 square miles.
Annual run-off in acre-feet: Truckee River at Tahoe (519 square miles), 1901 to 1913, maximum, 704,000; minimum, 113,000; mean, 295,000. Truckee River near Vista and Clark (1,740 square miles), 1900 to 1913, maximum, 1,435,000; minimum, 356,000; mean, 812,000. Carson River at Empire (988 square miles), 1901 to 1913, maximum, 731,000; minimum, 172,000; mean, 383,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to deliver water, season of 1914: 52,039 acres.
Area under water-right applications and rental contracts, season of 1914: 44,030 acres.
Length of irrigation season: From April 1 to October 15—198 days.
Average elevation of irrigable area: 4,000 feet above sea level.
Average annual rainfall on irrigable area: 4 inches; 1913, 8.08 inches—exceptionally wet.
Range of temperature on irrigable area: 0° to 105° F.
Character of soil of irrigable area: Exceedingly variable; sand, sandy loam, clay, adobe, and volcanic ash.
Principal products: Alfalfa, small grain, potatoes, onions, sugar beets, truck crop, and dairy products.
Principal markets: Nevada mining camps and California cities.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto: May 6 and November 1, 1907; January 30, April 4, June 5, and December 26, 1908; March 1 and September 28, 1909; April 26 and September 16, 1910; April 22 and October 17, 1911; February 8 and June 13, 1912; January 17, 1913.
Location of lands opened: Tps. 17 to 20 N., Rs. 23 to 31 E. Mount Diablo meridian.
Present status of irrigable lands: 21,322 acres entered subject to the reclamation act; 265 acres subject to entry; 102 acres State lands; 46,117 acres in private ownership (including 10,031 acres of railroad lands).
Limit of area of farm units: Public, 80 acres; private, 160 acres.
Duty of water: 3 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $22 and $30.
Annual operation and maintenance charge per acre of irrigable land: $0.75.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.
Construction recommended by director March 7, 1903.
Construction conditionally authorized by Secretary March 14, 1903.
Truckee Canal completed June, 1905.
First irrigation by Reclamation Service, season of 1906.
Lahontan Dam 80 per cent completed June 30, 1914.
Entire project 65.7 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Truckee-Carson project provides for storage in Lake Tahoe, in the Alkali Flat Reservoir, near Churchill, Nev., and in Lahontan Reservoir on Carson River, near Hazen, Nev.; the diversion of water from Truckee River by a dam about 20 miles below Reno, Nev., into the Truckee Canal, supplying water to lands in the Truckee and Carson River valleys and to the Lahontan Reservoir; the diversion of water from Carson River by a dam near Dayton, Nev., for storage in Alkali Flat Reservoir and irrigating lands in Churchill Valley below that reservoir; and the diversion of water from Carson River by a dam about 5 miles below the Lahontan storage dam into two canal systems, one on either side of the river, watering lands in the lower Carson River Valley. The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating waters arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law heretofore made for the purposes of the project.

The features of the above irrigation plan which have been completed are: The dam at the outlet of Lake Tahoe, including the greater portion of the accessory dredging of the Truckee River channel; the diversion dam in Truckee River near Derby, Nev.; the Truckee Canal carrying water from this diversion 31 miles to the terminal concrete chute discharging into the Lahontan Reservoir; the forebay for the hydroelectric plant discharging Truckee Canal water into Carson River below Lahontan Dam; the diversion dam in Carson River situated about 5 miles below Lahontan Dam; that portion of the irrigation system which includes laterals taking out of Truckee Canal in the vicinity of Fernley and Hazen; and the two main canals heading at Carson diversion dam and extending over the main portions of the project in Carson Sink with Fallon as a center.

Construction of Lahontan Dam is nearing completion for the storage of Carson River flood waters combined with the Truckee River surplus as delivered by Truckee Canal.

The features remaining for future construction are: The Alkali Flat Reservoir, or equivalent reservoirs in the upper Carson Valley, as may later be determined; the extension of the irrigation system to cover additional areas adjacent to and on all sides of the project as already constructed, and such extensions of the drainage system as may become necessary and of which the cost may be provided for.

CONSTRUCTION DURING FISCAL YEAR.

Lake Tahoe Dam.—In the summer of 1913 the outlet property at Lake Tahoe, being subject to a suit for condemnation by the United States, an agreement was made with the Truckee River General Electric Co., the owner of the property, to resume construction work on the dam at the lake outlet without prejudice to the rights of either party to the suit. Accordingly, in August, 1913, the Truckee River General Electric Co. resumed work on the remaining portion of the dam which had been commenced in the fall of 1909 under plans and specifications at that time approved by the United States Reclamation Service.

The dam, consisting of a reinforced concrete framework for inclosing the 17 sluice gates and surmounted by a wooden superstructure for sheltering the gate mechanism, was completed in the following October.

The accessory dredging of the river channel above the dam, including the removal of old cofferdams and other débris, together with necessary grading and riprapping about the ends of the dam, was completed in November and the construction plant removed.

The completion of this reinforced concrete dam as a substitute for the old timber dam built about 40 years previously finally accomplished the original design of the Reclamation Service for the control of Lake Tahoe levels within a reasonable limit of fluctuation.

Lahontan Dam.—This work has progressed in accordance with the original schedule and at a cost within the original estimate. A force averaging nearly 300 men has worked mainly in one daily 8-hour shift, but occasionally the exigencies of the work have required an additional night shift. There have been no fatal casualties or serious accidents during the year, and the sanitary conditions have preserved excellent health of the operatives and their families.

The hydroelectric power derived from the fall of Truckee Canal into Carson River below the dam has been used continuously for operating all of the machinery in building the dam except a small amount of steam power for narrow-gauge locomotives and small steam shovels.

The main embankment of the dam was built up about 80 feet during the year. This embankment was paved with gravel and rock on the upstream slope for about 60 feet, vertically; on the downstream slope to a height of 12 feet above the spillway pool; and approximately 50 feet, vertically, on the flanking downstream abutments. The left bank of the river below the spillway pool was also sloped and paved to the necessary height. The rock paving on the dam was hauled by the construction railway from the quarry, a mile and a half distant. Various necessary excavations were made for foundation walls, the stripping under the base of the embankment, and the trenching for the Lahontan bench siphon adjoining the dam. During the winter, when work on the dam was suspended on account of frost, the team force was employed in excavating the Lahontan Bench Canal in conjunction with building a dike southward from the main dam for about half a mile across the mesa, which is naturally about 4 feet below the top of the completed dam.

The large reinforced concrete outlet tower, with surmounting gatehouse, was completed from bottom to top, including the installation of the full set of 16 heavy cast-iron controlling gates, with their operating mechanism.

The cut-off wall through the base of the embankment was completed in the left abutment.

The principal portion of concrete work was in the two spillways. The left spillway was entirely completed, including the five roadway arches over the weir, and the right spillway was brought up to the bottom of the main weir wall. Concrete was also placed in the right upstream wing wall of the right spillway.

The 4-foot diameter reinforced concrete inverted siphon pipe for delivering water from Truckee Canal across the Carson River to the Lahontan Bench Canal was completed, including the terminal structure on the south side of the river, while on the north side the head structure and one section of the siphon were finished.

Having reached this stage of completion, the dam was placed on an operating basis on May 11, 1914, and 57,000 acre-feet of water were in storage on June 30, ready for delivery to the project lands.

The working program contemplates completion of the dam in all parts to its full capacity of 290,000 acre-feet before the end of the calendar year.

Lateral construction.—The construction of the "H" lateral, of approximately 50 second-feet capacity, for irrigating about 2,000 acres of land in the Douglass Island district was completed under small contracts with the farmers for a distance of about 3 miles, except two sections of 1,000 feet each, which were temporarily omitted on account of wet ground during the irrigation season. In the Stillwater district the Kemp-Winder lateral for watering about 500 acres south of Stillwater Slough was completed and put into operation in the season of 1914. Sections of other smaller laterals were built here and there in the project for individual delivery under water-right application.

Road work along Truckee Canal.—The rainstorms of 1913 emphasized the necessity for greater accessibility of Truckee Canal. During the fall and winter a small force completed the grading of the canal banks throughout the Canyon section below Derby, over the Gillpin spillway, and around the three canal tunnels, to complete a serviceable road traversing the entire canal. About 3 miles of new highway were graded from Lahontan westward to a connection with the main road to Dayton as a substitute for an equivalent length of road which is now submerged in Lahontan Reservoir.

DRAINAGE.

During the year about 13,000 feet of open and 15,000 feet of closed drains were constructed on the project. The first east drain, which consisted of 13,000 feet of open outlet and 8,350 feet of 15-inch tile, was completed. On the first southeast drain 7,000 linear feet of 12-inch and 15-inch tile had been placed up to June 30. On the latter drain the water is lifted about 5 feet at the lower end of the tile line by means of an electrically operated pump and discharged into a surface drain. The average depth of the tile lines constructed is about 8 feet. It was intended in the design of these lines to determine therefrom the most effective depth and type of drain for lowering and controlling the ground waters over the project. The results so far obtained seem to indicate that the subsoils of the project are sufficiently porous to permit of the ground water being held down and controlled by means of deep drains. The amount of water which has reached them also seems to indicate that deep drains will be effective for a considerable distance from there.

During the first part of the irrigation season of 1914 some difficulty was experienced in the operation and maintenance of the tile drains. This is due apparently in great part to the large quantities of surface water which in places accumulated over the pipe lines and

eventually found its way through the loose material into them. This condition shows that a careful application of water to the soils is necessary in order to protect drainage works.

OPERATION AND MAINTENANCE.

Water supply.—The irrigation season of 1913 was a period of phenomenal rainfall. Two inches of precipitation occurred during the last days of May, followed by storms in June, July, and August, which aggregated 6 inches, or 50 per cent more than the total average annual rainfall within four months. These rains had two principal effects, first, in decreasing the amount of water required for irrigation, and second, in washing débris into the Main Truckee Canal, which necessitated expensive cleaning for the first time in its eight years of operation. Notwithstanding the unusual summer rainfall, the water supply was the lowest on record except that of 1912, and the shortage of irrigation water in the latter part of the summer occasioned considerable inconvenience and loss of crops.

Lake Tahoe having become greatly depleted by two dry years in succession, it was only by special arrangement with the Truckee River General Electric Co., in control of the lake, that a small amount of storage water became available for the project during the latter portion of the irrigation season. Another small amount of stored water was secured by arrangement with the owners of Donner Lake, on the headwaters of Truckee River.

The snowfall on the watersheds during the winter of 1913–14 was again plentiful and resulted in moderate floods in both streams in the month of January, 1914, and for a sustained period during April, May, and June, thus giving an abundant water supply for immediate application to crops as well as for filling the depleted reservoirs. Lake Tahoe was again filled to its high-water level in June, and the new Lahontan Reservoir was used for storing water for the first time.

Use of water.—As compared with a minimum net delivery of 62,707 acre-feet of water in 1912, the corresponding figure for 1913 was 69,798 acre-feet, and the duty of water increased from 2.5 acre-feet per acre in 1912 to 2.26 acre-feet per acre in 1913. The duty was 4.46 acre-feet per acre in 1911, which was a year of abundant water supply. The water diverted from the streams in 1913 amounted to 186,175 acre-feet for the lands under water-right application, not including unsettled vested rights, which were supplied with additional amounts through the project system.

The distribution system comprising about 500 miles of canals and laterals was operated by the usual force, consisting of a water master and an average of eight ditch riders. A maintenance force under a general foreman, reporting to the superintendent of irrigation and comprising a variable number of men and teams, was engaged during the nonirrigation season in the usual work of cleaning and repairing laterals and drains. A smaller force was employed during the summer season for repairing the ordinary breaks in ditches and keeping all parts of the system in working order. The farmers with their teams were employed from time to time at a day wage to assist in emergency or the regular work of maintenance.

Historical review, Truckee-Carson project.

Item.	1909	1910	1911	1912	1913	1914 to June 30.
Acreage for which service was prepared to supply water	52,039	52,039	52,039	52,039	52,039	52,039
Acreage irrigated	29,325	27,557	30,139	36,620	43,075	43,075
Miles of canal operated	280	280	292	294	295	295
Water diverted (acre-feet)	199,639	177,576	262,619	170,763	186,175	.....
Water delivered to land (acre-feet)	144,023	128,249	143,746	62,707	69,798	.....
Per acre of land irrigated (acre-feet)	5.01	4.65	4.46	2.50	2.26	.....

SETTLEMENT.

With homestead lands withdrawn from entry and water-right applications suspended for private lands, settlement during the past year made no advance except for some shifting, with a slight increase of farming population in the process of assignment of entries and a subdivision of private-land holdings. Many inquiries were received from prospective settlers, and the indications are that there will be a substantial increase of development with the reopening of project lands for water rights which is planned for the fall of 1914. In general, the present population is well established and composed of resident farmers who live upon and cultivate their own lands.

Settlement data, Truckee-Carson project.

Item.	1912	1913	1914
1. Total number of farms on project	497	494	494
2. Population of (1)	.....	1,635	1,635
3. Number of irrigated farms	.....	494	494
4. Operated by owners or managers	.....	439	439
5. Operated by tenants	.....	55	55
6. Population of (3)	.....	1,635	1,635
7. Number of towns	4	4	4
8. Population of (7)	.....	1,250	1,250
9. Total population in towns and on farms (sum of (2) and (8))	.....	2,885	2,885
10. Number of public schools	18	18	19
11. Number of churches	7	8	8
12. Number of banks	1	1	1
13. Total capital stock	$100,000	$100,000	$100,000
14. Total amount of deposits	$260,000	$300,000	$350,000
15. Total number of depositors	550	600	650
16. Number of relinquishments	41	12	3
17. Number of cancellations	6	.....	.....

PRINCIPAL CROPS.

Alfalfa continues the principal staple upon which is based the feeding of beef cattle and sheep for market, the keeping of dairy cows, and the marketing of baled hay. Owing to the uncertainty of the latter market, which is largely dependent upon the varying hay-crop conditions in California, there is a strong tendency toward increase of the dairy industry and the consumption of alfalfa upon the project.

During 1913 the beet-sugar factory disposed of the project output of about 10,000 tons of sugar beets. The project lands are well adapted to the growth of this crop, and while the financial vicissi-

tudes of the sugar mill have caused a suspension of its activity for the present, it is believed that the production of beet sugar will eventually become one of the main industries of the project.

The usual amounts of grain, principally barley, were grown. The tendency toward truck farming, including potatoes, celery, onions, cantaloupes, and similar crops, is increasing, and the exceptionally high quality of these products should result in the development of a fancy market.

The total value of project crops in 1913 approximated $555,000, as compared with $470,000 in the previous year. About 5,000 acres of new lands were leveled and seeded during the year.

Prices for all crops, except hay, were well maintained. The poor demand for baled hay, with the difficulty of marketing that portion damaged by the excessive rains of last year, tended to weaken the reliance upon this method of marketing the principal crop.

Crop report, Truckee-Carson project, year of 1913.

Crop.	Area. acres.	Unit. of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit. of yield.	Total.	Per acre.
Alfalfa hay	13,960	Ton	45,132	3.23	[1] $7.00	$315,924	$22.61
Alfalfa, young[1]	4,523	do	503			3,518	[2] 0.78
Barley	1,880	Bushel	43,238	23.00	.60	25,942	13.80
Beets, sugar	1,079	Ton	9,460	8.76	6.00	56,760	52.50
Garden	180					19,779	109.80
Hay, except above	3,467	Ton	4,001	1.15	7.00	28,007	8.05
Oats	283	Bushel	10,274	36.30	.40	4,110	14.52
Onions for market	38	do	10,915	287.23	.80	8,732	229.78
Pasture	18,352					36,457	1.98
Potatoes, common	416	Bushel	29,789	71.61	.75	22,342	53.70
Wheat	1,590	do	30,271	19.03	.85	25,730	16.17
Miscellaneous	336					7,707	22.93
Less duplicated areas	3,161						
Total cropped	42,943						
Total and average						555,007	[2] 12.92
Less pasture (18,352 acres)	24,591					518,550	21.10
Irrigated, no crop:							
Young alfalfa[2]	4,523						
Nonbearing orchard	132						
Less duplicated areas	4,523						
Total	132						
Total irrigated	43,075						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	[3] 52,039	494
Total irrigated area farms reported	43,075	494
Under water-right applications and contracts	30,857	484
Under unsettled vested water rights	12,218	10
Total cropped area farms reported	42,943	494

[1] Value in stack.
[2] Exclusive of young alfalfa the average value of crops per acre cropped is $14.10 instead of $12.92.
[3] Actual irrigable area of project as platted. Irrigable area of farms, including unsettled vested water-right land reported as 56,955 acres.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Truckee-Carson project, to June 30, 1914.

ASSETS.

Cash in other employees' hands awaiting transfer to fiscal agent		$349.91
Accounts receivable:		
Uncollected water rentals	$28.50	
Uncollected miscellaneous rentals	429.25	
Uncollected miscellaneous items	168.09	
Construction charges due and uncollected from water-right applicants	66,885.64	
Operation and maintenance charges due and uncollected from water-right applicants	3,675.03	
Total		71,186.51
Inventories:		
Mercantile stores stock on hand	$4,910.83	
Animals	13,720.84	
Mechanical and other equipment	163,473.57	
Material and supplies on hand in storehouses	31,941.57	
Goods in transit	351.88	
Undistributed cost (freight and handling on inventory property)	[1] 5,179.00	
Total		209,219.69
Construction work in process:		
Gross expenditures for construction of project to date		5,558,833.49
Less revenue earned during construction, as follows:		
Rentals of cottages	$8,660.67	
Rentals of grazing lands	12,742.21	
Miscellaneous revenues	6,096.20	
Profits on mess houses	16,524.03	
Profits on mercantile stores	15,677.86	
Loss on hospitals	[1] 498.85	
Contractors freight refunds	300.00	
Forfeitures by defaulting bidders and contractors	499.95	
Adjustments:		
Depreciation on plant and equipment	123,003.89	
Profits shown on Government animals	23,569.61	
Total deductions		206,575.57
Net expenditures for construction of project to date		5,352,257.92
Deferred operation and maintenance charges		148,412.95
Total assets		5,781,426.98

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$15,802.45	
Unpaid purchases	11,353.49	
Unpaid contract estimates	6,680.85	
Unpaid freight and express charges	35,899.50	
Unpaid passenger fares	22.25	
Unpaid agreements to purchase real estate	1,957.50	
Unredeemed coupon books	261.95	
Unredeemed meal tickets	280.50	
Unpaid miscellaneous (cooperative certificates)	27.00	
Total		72,285.49

[1] Deduct.

Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		$304,409.13	
Construction charges paid in advance by water-right applicants		1,675.75	
Construction charges paid and forfeited by water-right applicants		1,317.80	
Total			$307,402.68
Net investment:			
Disbursements	$5,631,438.08		
Transfers received from other projects	262,960.02		
		$5,894,398.10	
Less:			
Collections	456,189.82		
Transfers issued to other projects	36,469.47		
		492,659.29	
Total			5,401,738.81
Total liabilities, reserves, and capital investment of the Government			5,781,426.98

Functional feature costs of Truckee-Carson project to June 30, 1914.

Development (storage) works	$1,432,979.98
Carriage system	2,215,474.89
Distribution and surface drainage system	1,304,447.05
Deep drainage and flood protection system	164,056.81
Power system	109,254.95
Real estate	29,633.98
Telephone lines	42,210.39
Farm unit subdivisions	9,011.34
Roads and bridges	39,599.73
Miscellaneous preliminary investigations	160,843.61
Operation and maintenance during construction	48,888.18
Cost ledger inventories	2,432.58
Gross expenditures for construction of project to date	5,558,833.49

Operating revenues and expenses, Truckee-Carson project, to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$22,772.38
Maintenance	12,086.41
Carriage system:	
Operation	4,792.88
Maintenance	14,753.21
Distribution system:	
Operation	106,507.68
Maintenance	128,310.26
Drainage and flood protection system:	
Operation	280.79
Maintenance	28,211.06
Total	317,714.67

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$144,484.42
Operation and maintenance charges paid in advance by water-right applicants	253.64
Operation and maintenance charges paid and forfeited by water-right applicants	1,275.07
Rentals of lands and buildings	348.27
Rentals of power and light	7,544.05
Rentals of irrigation water	4,809.96
Miscellaneous revenues	10,586.31
Deferred operation and maintenance revenues (carried to debit side of assets and liabilities statement)	148,412.95
Total	317,714.67

Estimated cost of contemplated works, Truckee-Carson project, during fiscal year, 1915.

Development (storage) works:			
Lahontan Reservoir		$220,000.00	
Real estate purchases—			
Lake Tahoe outlet	$28,000.00		
Additional lands for Lahontan Reservoir	2,000.00		
Donner Lake Reservoir	50,000.00		
		80,000.00	
Reservoir examinations		10,000.00	
			$310,000.00
Carriage system:			
Lahontan Bench Canal		18,000.00	
Supplemental construction		5,000.00	
			23,000.00
Distribution system:			
Ditch tenders' houses		1,500.00	
District 1, laterals and drains		5,000.00	
District 2, laterals and drains		5,000.00	
District 3, laterals and drains		5,000.00	
District 7, laterals and drains		5,000.00	
Real estate		1,000.00	
Supplemental construction		2,000.00	
			24,500.00
Drainage and flood-protection system:			
Deep drainage system		14,000.00	
Drainage investigations		5,000.00	
			19,000.00
Power system:			
Auxiliary water supply		12,000.00	
Additional unit under lease, Lahontan plant		20,000.00	
			32,000.00
Real estate			2,000.00
Telephone system			1,000.00
Farm unit subdivisions			5,000.00
Roads and bridges			1,000.00
Miscellaneous investigations:			
Water-right surveys and adjudications		10,000.00	
Hydrography and miscellaneous examinations		5,000.00	
			15,000.00
Operation and maintenance under public notice			74,000.00
Total			506,500.00

NEW MEXICO, CARLSBAD PROJECT.

L. E. Foster, project manager, Carlsbad, N. Mex.; C. A. May, assistant project manager.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

County: Eddy.
Townships: 18 to 24 S., Rs. 25 to 29 E., New Mexico meridian.
Railroad: Atchison, Topeka & Santa Fe System.
Railroad stations and estimated population January 1, 1914: Carlsbad, 2,700; Otis, 75; Loving, 150; and Malaga, 75.

WATER SUPPLY.

Source of water supply: Pecos River.
Area of drainage basin: 22,000 square miles.
Annual run-off in acre-feet of Pecos River at Carlsbad and Dayton (22,000 square miles), 1899 to 1913: Maximum, 912,000; minimum, 148,000; mean, 304,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: 20,261 acres.
Area under water-right applications, season of 1914: 20,273 acres (difference due to fractional acres).
Length of irrigating season: From March to November and two weeks in winter, 260 days.
Average elevation of irrigable area: 3,100 feet above sea level.
Average annual rainfall on irrigable area: 1902–1913, 15 inches; calendar year 1913, 15.33 inches. Relatively wet year.
Range of temperature on irrigable area: —3° to 110° F.
Character of soil of irrigable area: Pecos—Sandy loam with large lime content.
Principal products: Alfalfa, cotton, grain crops, grapes, melons, peaches, pears, and miscellaneous fruits.
Principal markets: Carlsbad, N. Mex.; Denver, Colo.; Chicago, Ill.; Kansas City, Mo.; Texas cities; New York, N. Y.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: December 17, 1907; November 30, 1908; June 2, 1909; November 17, 1909; October 7, 1910; March 13, 1911; February 17, 1912.
Location of lands opened: Ts. 21, 22, 23, and 24 S., Rs. 26, 27, 28, and 29 E., New Mexico meridian.
Irrigable lands opened: 20,261 acres; all in private ownership.
Limit of area of farm units: 160 acres.
Duty of water: 3 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $31 and $45.
Annual operation and maintenance charge: $1 and $1.75 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1904.
Construction recommended by board of engineers, August 31, 1905.
Construction authorized by Secretary, February 24, 1906.
Canal system of Pecos Irrigation Co. purchased February, 1906.
First irrigation by Reclamation Service, season of 1907.
Project completed, 1912.

IRRIGATION PLAN.

The irrigation plan of the Carlsbad project provides for the storage of water in Lake McMillan, on Pecos River, near Lakewood, N. Mex., and in a storage and distributing reservoir on the same river near Carlsbad, N. Mex., controlled by Avalon Dam, and the diversion of water from Avalon Reservoir into a canal system, watering lands on both sides of Pecos River in the vicinity of Carlsbad. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The construction of the project was completed in 1912, and the principal features are: The Avalon and McMillan earth and rock-fill dams, the former having a concrete core wall; a concrete flume or aqueduct spanning the Pecos River, with 4 arches of 100 feet each; a reinforced concrete siphon 6 feet in diameter and 400 feet long, under Dark Canyon; about 50 miles of canals and laterals (exclusive of sublaterals and ditches); a concrete head-gate structure at each of the dams and 2 tunnels driven through rock, each 21 feet in diameter, lined with concrete, aggregating 200 feet in length, equipped with heavy cylindrical gates, operated by turbines (replacing concrete spillway, equipped with wooden emergency gates; spillway having been closed with concrete). All check-gate, spillway, and head-gate structures on the canals, and all turnouts on the laterals, are of concrete construction.

CONSTRUCTION DURING FISCAL YEAR.

Concrete farm turnouts and weirs have been built as required.

DRAINAGE.

During the fiscal year two lines of closed drains were constructed on the project. Drain A is 8,200 feet long and is intended to drain and protect about 750 acres. Drain C is 7,500 feet long and serves 315 acres. The average depth of these drains is about 8 feet. The results so far obtained seem to indicate that this type of closed drain will be effective in lowering and controlling the water table. The drains so far constructed have been so located as to intercept the underground losses which are being carried through the porous subsoil. Frequently it has been found that these percolations are through the porous gypsum rock or gravel.

On the two areas above mentioned and served by drains A and C the lowering of the water table up to June 30 had been sufficient to permit most of that previously seeped being brought under cultivation.

There are on the project considerable areas immediately below the main canal which have become seeped through direct losses from that canal. In order to protect these lands, investigations and studies were made, from which the conclusion was reached that the best method for protecting these areas is by placing a waterproof lining in the canal. About 1 mile through a gypsum district was concrete lined during February, 1914, and as a result the water table on this area adjacent to the canal has been appreciably lowered during the irrigation season. The additional area seeped or water-logged from the main canals can be protected by the extension of the concrete linings.

On one additional area located north and east of the town of Loving seepage has appeared and the affected area is gradually increasing. Plans for deep drains for reclaiming and protecting this area are now being prepared.

OPERATION AND MAINTENANCE.

There has been an abundant supply of water for the entire system during the season of 1914, and much water has been wasted. The area irrigated during 1913 amounted to 14,260 acres, while the area actually irrigated to June 30, 1914, amounts to 13,170 acres. Several laterals have been enlarged and the usual summer cleaning of canals and laterals has been accomplished.

Historical review, Carlsbad project.

Item.	1909	1910	1911	1912	1913	1914 [1]
Acreage for which service was prepared to supply water	20,267	20,267	20,267	20,277	20,261	20,261
Acreage irrigated	12,170	13,203	14,853	13,509	14,260	13,170
Miles of canal operated	45	45	45	45	45	45
Water diverted (acre-feet)	85,573	93,351	85,100	85,086	86,560	85,000
Water delivered to land (acre-feet)	27,830	31,561	33,198	38,764	33,044	35,000
Per acre of land irrigated (acre-feet)	2.3	2.4	2.2	2.9	2.3	2.3

[1] Estimated.

SETTLEMENT.

There are two cooperative organizations on the project—the Otis Creamery, composed of about 75 water users, and the Otis Union, which makes minor purchases for the farmers. The cooperative creamery, organized during the season of 1912, is producing a small amount of a very good quality of butter, which is being marketed locally. This association has made some progress during the past year, but not enough of the farmers are interested in the dairy industry. Quite a number of sales of land have been made during the year, but the total population on the farms has not increased materially on account of families moving away from the project. However, the prospects are brighter this season than ever for the settlement of the project on a more permanent basis, and the settlers generally are much encouraged over the future of the project. The crying need, however, is for more people on the farms.

Settlement data, Carlsbad project.

Item.	1912	1913	1914
1. Total number of farms on project	[1] 521	519	524
2. Population of (1)	675	940	950
3. Number of irrigated farms	345	362	362
4. Operated by owners or managers	145	224	240
5. Operated by tenants	[2] 200	138	122
6. Population of (3)	650	910	925
7. Number of towns	4	4	4
8. Population of (7)	3,000	3,100	3,200
9. Total population in towns and on farms (sum of (2) and (8))	3,675	4,040	4,150
10. Number of public schools	7	7	7
11. Number of churches	8	8	8
12. Number of banks	2	2	2
13. Total capital stock	$80,000	$80,000	$80,000
14. Total amount of deposits	.....	.....	$547,000
15. Total number of depositors	.....	.....	1,400

[1] Water-right applications.
[2] In 1912 many farms were operated by 1 man. The 200 farms were actually operated by 28 tenants.

PRINCIPAL CROPS.

During the season 1913 the total area in all crops amounted to 14,260 acres or 800 acres more than in 1912. The yields for the two principal crops, alfalfa and cotton, showed a slight increase per acre for the season 1913. This is also true as to the average price per acre, alfalfa showing an increase of 75 cents per acre and cotton $3.60 per acre over the previous year. An increase of $2.85 per acre for the value of all crops is also noted. The total acreage up to midsummer in crops for the season 1914 is less than for the previous year and about the same as for 1912. The stand of cotton is exceptionally good. Alfalfa yields per acre promise to be from 60 to 75 per cent greater than the previous year's yield, although a considerable portion of the first crop was damaged by excessive rainfall.

Crop report, Carlsbad project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	7,891	Ton	12,760.3	1.6	$9.63	$122,997	$15.58
Alfalfa seed	2,894	Bushel	6,864.3	2.37	4.34	29,841	10.31
Apples	10	Pound	16,200	1,620	.022	360	36.00
Beans	2	Bushel	6	3	4.20	25	12.60
Cane	142	Ton	373¼	2.62	7.02	2,623	18.47
Clover seed	3	Bushel	14	4.66	5.40	76	25.20
Corn, broom	6	Pound	1,200	200	.025	30	5.00
Corn, Indian	278	Bushel	4,411	15.86	1.11	4,912	17.66
Corn, sorghum	1,232	do	17,045	13.83	.81	13,954	11.32
Corn, fodder	223	Ton	551½	2.47	5.44	3,000	13.45
Cotton	1,510	Pound	300,000	198.68	.13	39,000	25.83
Cotton seed	1,510	do	600,000	397.36	.0105	6,300	4.17
Fruits, small	1.5	do	2,375	1,583	.04	95	63.32
Garden	27					1,950	70.92
Millet seed	.5	Bushel		12	1.50	9	18.00
Oats	90	do	6,388	15.42	1.17	6,637	18.18
Pasture	581					5,231	8.99
Peaches	174	Pound	742,500	4,255	.03	22,275	127.65
Peanuts	2	do	800	400	.05	40	20.00
Potatoes, sweet	16	Bushel	808	50.5	1.38	1,119	69.92
Straw	671	Ton	271	.4	5.77	1,565	2.33
Wheat	1	Bushel	30	30	1.20	36	36.00
Melons	4					200	50.00
Less duplicated areas	5,075						
Total cropped	12,195						
Total and average						257,275	21.10
Irrigated, no crop:							
Young alfalfa	1,467.75						
Young orchard	232.25						
Miscellaneous	365						
Total	2,065						
Total irrigated	14,260						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	16,299	362
Total irrigated area farms reported	14,260	362
Under water-right applications	14,260	362
Total cropped area farms reported	12,195	362

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Carlsbad project, to June 30, 1914.

ASSETS.

Accounts receivable:		
Uncollected water rentals	$364.13	
Uncollected miscellaneous items	330.20	
Construction charges due and uncollected from water-right applicants	42,326.30	
Operation and maintenance charges due and uncollected from water-right applicants	3,957.75	
Total		$46,978.38
Inventories:		
Animals	400.00	
Mechanical and other equipment	12,298.76	
Material and supplies on hand in storehouses	4,550.19	
Unadjusted transfers between projects	[1] 19.88	
Total		17,229.07
Construction work in process:		
Gross expenditures for construction of project to date	893,799.62	
Revenue earned during construction as follows—		
Rentals of cottages	$578.00	
Rentals of irrigation water	8,163.35	
Miscellaneous revenues	2,055.02	
Profits on hospitals	1,117.10	
Adjustments—		
Depreciation on plant and equipment	632.25	
Profits shown on Government animals	943.05	
Total deductions	13,488.77	
Net expenditures for construction of project to date		880,310.85
Deferred operation and maintenance charges		2,392.10
Total assets		946,910.40

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	$3,142.88	
Unpaid purchases	992.83	
Unpaid freight and express charges	2,962.54	
Unpaid passenger fares	8.35	
Unpaid miscellaneous	3.00	
Total		$7,109.60
Reserves for repayment to reclamation fund of cost of project:		
Construction charges accrued on contracts with water-right applicants	114,026.80	
Construction charges paid in advance by water-right applicants	38,970.30	
Construction charges paid and forfeited by water-right applicants	108.50	
Total		153,105.60

[1] Deduct.

Net investment:			
Disbursements	$1,014,544.76		
Transfers received from other projects	29,506.90		
		$1,044,051.66	
Less—			
Collections	244,111.61		
Transfers issued to other projects	13,244.85		
		257,356.46	
Total			$786,695.20
Total liabilities, reserves, and capital investment of the Government			946,910.40

Functional feature costs of Carlsbad project to June 30, 1914.

Development (storage) works	$401,313.67
Carriage system	211,509.49
Distribution system	55,081.93
Drainage and flood protection system	32,907.99
Real estate	151,904.96
Farm-unit subdivisions	41,081.56
Gross expenditures for construction of project to date	893,799.62

Operating revenues and expenses Carlsbad project to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$7,875.00
Maintenance	4,310.49
Carriage system:	
Operation	4,621.54
Maintenance	18,486.18
Distribution system:	
Operation	50,189.94
Maintenance	33,459.96
Undistributed expenses:	
Operation	3,071.64
Maintenance	4,607.46
Total	126,622.21

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$115,757.45
Operation and maintenance charges paid in advance by water-right applicants	714.24
Operation and maintenance charges paid and forfeited by water-right applicants	85.95
Rentals of lands and buildings	1,834.44
Rentals of irrigation water	4,324.01
Miscellaneous revenues	1,514.02
Deferred operation and maintenance revenues	2,392.10
Total	126,622.21

Estimated cost of contemplated works, Carlsbad project, during fiscal year 1915.

Development (storage) works:			
McMillan Dam—			
Purchase of lands	$50,000.00		
Head gates, replacing	7,000.00		
Miscellaneous	1,000.00		
		$58,000.00	
Avalon Dam, miscellaneous		1,500.00	
			$59,500.00
Carriage system, Main Canal, concreting section			52,000.00
Distribution system:			
Laterals and structures, new		$10,000.00	
Ditch rider's residence, Loving		2,000.00	
			12,000.00
Drainage and flood protection system:			
Drain "D" and extensions			50,000.00
Operation and maintenance under public notice			25,000.00
Total			198,500.00

NEW MEXICO, HONDO PROJECT.

L. E. Foster, project manager, Carlsbad, N. Mex.; C. A. May, assistant project manager.

(For *Results to June 30, 1913*, and *Data for Complete Projects*, see appendix.)

LOCATION.

County: Chaves.
Townships: 11 and 12 S., Rs. 22, 23, and 24 E., New Mexico meridian.
Railroad: Atchison, Topeka & Santa Fe Ry.
Railroad station and estimated population, January 1, 1914: Roswell, N. Mex., 7,000.

WATER SUPPLY.

Source of water supply: Hondo River.
Area of drainage basin: 1,037 square miles.
Annual run-off in acre-feet of Hondo River at the diversion dam (1,037 square miles), 1903 to 1913: Maximum, 90,500; minimum, 2,100; mean, 29,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service was prepared to supply water season of 1914: 1,200 acres.
Area under rental contracts season of 1914: 2,705 acres.
Length of irrigating season: From March to November—245 days.
Average elevation of irrigable area: 3,750 feet above sea level.
Average annual rainfall on irrigable area: 18 years, 14.4 inches; 1913, 15.04 inches. Relatively wet year.
Range of temperature of irrigable area: 0° to 100° F.
Character of soil of irrigable area: Rich alluvium.
Principal products: Alfalfa and fruits.
Principal markets: Roswell, N. Mex.; Kansas City, Mo.; Chicago, Ill.; and Texas cities.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice; 932 acres were irrigated under rental contracts to December 31, 1913, and 1,069 to June 30, 1914.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers June 6, 1904.
Construction authorized by Secretary September 6, 1904.
Hondo Reservoir site purchased December 3, 1904.
Hondo Reservoir and inlet canal completed August, 1906.
Distributing canals completed April, 1907.
Project completed May, 1907.

IRRIGATION PLAN.

The irrigation plan of the Hondo project provides for the diversion of water from the Hondo River about 12 miles southwest of Roswell, N. Mex., through a short inlet canal, into a natural storage reservoir, the capacity of which is increased by embankments; the return of stored water to the river, and the diversion of water from the river by three dams, 2, 4, and 6 miles, respectively, below the reservoir, into canal systems watering lands in the vicinity of Roswell, N. Mex. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

All features of this project are completed, and no construction work was in progress during the fiscal year.

CONSTRUCTION DURING FISCAL YEAR.

No construction work was done during the fiscal year. Preliminary investigations were in progress, however, to determine the cost of conducting water diverted from the Hondo River, at a point near the Diamond "A" ranch, into a proposed cement-lined canal 12 miles in length, and delivering it into the distributing system of the Hondo project.

OPERATION AND MAINTENANCE.

Water from the Hondo River was diverted directly into the canal system, irrigating 932 acres during the calendar year 1913, and 1,069 acres have been irrigated to June 30 of the current year.

Cleaning canals and laterals of silt and weeds has constituted the principal maintenance work. The watchman's residence at the reservoir was repainted and repapered.

Historical review, Hondo project.

Item.	1909	1910	1911	1912	1913	1914, estimated.
Acreage for which service was prepared to supply water			1,100	1,200	1,000	1,200
Acreage irrigated			1,136	1,261	932	1,200
Miles of canal operated		12½	12½	12½	12½	12½
Water diverted (acre-feet)	2,058	4,225	21,020	13,062	2,188	3,000
Water delivered to land (acre-feet)		1,170	1,049	1,640	800	1,200
Per acre of land irrigated (acre-feet)		0.9	0.9	1.3	0.86	1

SETTLEMENT.

A few farms were transferred during the year, the population remaining practically unchanged. The water-rental contracts signed for the years 1913 and 1914 numbered 28 and 25, representing 22 and 25 farms, respectively.

Settlement data, Hondo project.

Item.	1912	1913	1914
1. Total number of farms in project	26	22	25
2. Population of (1)	85	77	80
3. Number of irrigated farms	23	22	25
4. Operated by owners or managers	16	12	17
5. Operated by tenants	7	[1] 5	8
6. Population of (3)	70	77	80
7. Number of towns	1	1	1
8. Population of (7)	7,000	7,000	7,000
9. Total population in towns and on farms (sum of (2) and (8))	7,085	7,077	7,080
10. Number of public schools	3	3	3
11. Number of churches	9	9	9
12. Number of banks	4	4	4
13. Total capital stock			$350,000.00
14. Total amount of deposits			$2,553,425.16

[1] 5 farms not occupied.

PRINCIPAL CROPS.

Alfalfa, sorghum, apples, and peaches are the principal crops raised on the Hondo project. The acreage irrigated and cropped and the value of the crops for 1913 show a decrease over the same items for 1912.

This decrease was due to the uncertainty of the supply of water available for the farms. Water delivered to the farms during 1912 amounted to 1,640 acre-feet, while in 1913 it was only 800 acre-feet. It is expected that the crop production for the current year will exceed that of 1913.

Crop report, Hondo project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa	648	Ton	1,081	1.67	11.61	$12,558	$19.38
Apples	44	Pound	66,500	15.11	.0094	628	14.27
Peaches	30		3,333		.03	100	3.33
Cane	80	Ton	95	1.19	9.47	900	11.25
Small fruit	6		1,250		.04	50	8.33
Total	808					14,236	17.62
Irrigated, no crops	124						
Total irrigated	932						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	2,085	22
Total irrigated area farms reported	932	22
Under rental contracts	932	22
Total cropped area farms reported	808	20

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Hondo project, to June 30, 1914.

ASSETS.

Accounts receivable, uncollected water rentals		$11.53
Inventories:		
Animals	$150.00	
Mechanical and other equipment	432.15	
Material and supplies on hand in storehouses	18.65	
Unadjusted transfers between projects	[1] 52.27	
Total		548.53
Construction work in process:		
Gross expenditures for construction of project to date	368,749.11	
Less revenue earned during construction as follows:		
Rentals of irrigation water	$6,352.68	
Miscellaneous revenues	15.75	
Profits on hospitals	41.75	
Contractors' freight refunds	159.63	
Adjustments—		
Profits shown on Government animals	61.10	
Total deductions	6,630.91	
Net expenditures for construction of project to date		362,118.20
Total assets		362,678.26

[1] Deduct.

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$261.72	
Unpaid freight and express charges		3.13	
Unpaid passenger fares		60.95	
Total			$325.80
Net investment:			
Disbursements	$381,703.98		
Transfers received from other projects	13,354.99		
		395,058.97	
Less—			
Collections	31,914.99		
Transfers issued to other projects	791.52		
		32,706.51	
Total			362,352.46
Total liabilities, reserves, and capital investment of the Government			362,678.26

Functional feature costs of Hondo project to June 30, 1914.

Development (storage) works	$211,998.19
Carriage system	58,344.63
Distribution system	38,979.34
Real estate	1,738.99
Telephone lines	4,170.42
Farm-unit subdivisions	19,837.41
Miscellaneous preliminary investigations	3,977.82
Operation and maintenance during construction	29,702.31
Gross expenditures for construction of project to date	368,749.11

Estimated cost of contemplated work, Hondo project, during fiscal year 1915.

Distribution system, laterals and structures		6,000.00
Operation and maintenance during construction:		
Operation	$1,800.00	
Maintenance, inlet canal	200.00	
Maintenance, reservoir	300.00	
Maintenance, distribution system	1,400.00	
Maintenance, telephone line	50.00	
Maintenance, bridges and roads	100.00	
Maintenance, buildings	150.00	
		4,000.00
Total		10,000.00

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

L. M. Lawson, project manager, El Paso, Tex.; E. H. Baldwin, construction engineer, Elephant Butte Dam, Elephant Butte, N. Mex.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Socorro, Sierra, Dona Ana, N. Mex.; El Paso, Tex.

Townships: 8 to 29 S., Rs. 3 E. to 5 W., New Mexico meridian.

Railroads: Atchison, Topeka & Santa Fe; El Paso & Southwestern; Southern Pacific; and Texas & Pacific.

Railroad stations and estimated population, January 1, 1914: Elephant Butte, 2,500; Engle, 300; Rincon, 230; Dona Ana, 600; Las Cruces, 4,500; Mesilla Park, N. Mex., 500; La Tuna, 500; El Paso, 65,000; Ysleta, 700; and Fabens, Tex., 200.

WATER SUPPLY.

Source of water supply: Rio Grande.

Area of drainage basin: 37,000 square miles.

Annual run-off in acre-feet of Rio Grande: At San Marcial (30,000 square miles), 1895 to 1913—maximum, 2,420,000; minimum, 201,000; mean, 1,125,000. At El Paso, Tex. (38,600 square miles), 1889 to 1913—maximum, 2,010,000; minimum, 50,700; mean, 920,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: Leasburg unit, 25,000 acres; El Paso Valley, 15,000.

Area under rental contracts, season of 1914: 28,000 acres.

Length of irrigating season: From February 15 to November 15—274 days.

Average elevation of irrigable area: 3,700 feet above sea level.

Average annual rainfall on irrigable area: 29 years, 9.84 inches; 1913, 7.09 inches.

Range of temperature on irrigable area: 0° to 100° F.

Character of soil of irrigable area: Fertile alluvium and sandy loam.

Principal products: Alfalfa, corn, wheat, melons, fruit, and vegetables.

Principal markets: Towns in Texas, New Mexico, Louisiana, and Eastern cities.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice. All lands of Leasburg unit and in El Paso Valley are being irrigated under rental contracts.

CHRONOLOGICAL SUMMARY.

Reconnoisance and preliminary surveys begun in March, 1903.

Construction of Leasburg unit recommended November 29, 1905.

Construction of Leasburg unit authorized December 2, 1905.

Reclamation act extended to Texas, June 12, 1906 (34 Stat., 259).

Treaty with Mexico providing for distribution of waters of the Rio Grande proclaimed January 16, 1907.

Construction of Elephant Butte Dam authorized by Congress and $1,000,000 appropriated March 4, 1907 (34 Stat., 1357).

Leasburg unit completed July, 1908.

First irrigation by Reclamation Service (Leasburg unit), season of 1908.

Construction of Elephant Butte Dam authorized by Secretary May 23, 1910.

Construction plans of Elephant Butte Dam approved by board of engineers June 6, 1910, January 22, 1911, August 12, 1912, January 30, 1913.
Construction plans approved by Secretary October 26, 1910.
Franklin Canal purchased October, 1912.
Elephant Butte Dam 64.3 per cent completed June 30, 1914.
Entire project 15.6 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Rio Grande project provides for the storage of flood waters of the Rio Grande in a reservoir controlled by Elephant Butte Dam, about 12 miles west of Engle, N. Mex., and the diversion of water from the Rio Grande, about 6 miles below the storage dam, for the irrigation of lands in Las Palomas Valley; about 24 miles below for watering lands in Rincon Valley; about 69 miles below for the irrigation of 28,000 acres in the upper Mesilla Valley under the Leasburg diversion dam; about 80 miles below for the irrigation of 57,000 acres in the lower Mesilla Valley under the Mesilla dam, and about 120 miles below for supplying water to lands in El Paso Valley, and furnishing 60,000 acre-feet per annum for use on land in El Paso Valley, on the Mexican side of the Rio Grande. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

All the irrigation works required for Las Palomas and Rincon Valleys will be new; those for the Mesilla Valley include a diversion dam and 6½ miles of canal now constructed, as well as a diversion dam to be built 5½ miles southwest of Las Cruces, to divert water for the lower end of the Mesilla Valley, and those required for El Paso Valley will supplement and improve the present canal systems.

The features of the above irrigation plan that have been constructed are the diversion dam, headworks, and portion of main canal for the 28,000 acres in the upper Mesilla Valley unit.

Construction work is in progress on the Elephant Butte Dam and the features remaining for future construction are the diversion dams and canal systems for the Palomas and Rincon Valley; the Mesilla Dam and main systems for the Mesilla Valley; and the canal system for the El Paso Valley.

CONSTRUCTION DURING FISCAL YEAR.

Elephant Butte Dam.—All preliminary work in connection with the main dam has been completed. Final plans are yet to be made for the spillway and for the earth embankment. Road work is complete except for the permanent road which is to be built from the dam to the present Engle road. Excavation and concreting have proceeded all year. The river section of the excavation is now completed and the foundation covered with concrete from station 4+20 to station 9+50. Excavation is now confined to the abutments. The excavation for foundation extended to a much greater depth than was anticipated, and the lowest point reached was 101 feet below the original surface. Expansion joints have been started. Two summer blocks are under way, one of them being at an average elevation of 4,260, or 150 feet above the foundation, the other at elevation 4,219. The remaining portion from station 7+19 to station 9+50 is at an average elevation of 4,210. All material for the gates has been ordered, and much of it is on the ground. This material consists of four service gates, six penstock gates, two double sluice gates, and four balanced valves, all with the necessary liner pipes, transition casting, etc. The sluice gates and penstock gates have arrived and their installation will start within a month. Designs for the trash rack and straining tower are complete, and the required reinforcing material has arrived. During the year the sand-cement plant has been increased by the addition of a fourth tube mill; the air-com-

pressing plant by a second compressor; a third quarry was opened, and new derricks and hoists purchased or transferred. Sand for concrete is now being drawn from the sand storage pile, which is one of the results of the excavation for foundations.

El Paso Valley.—The Franklin Canal was purchased for $120,000 in October, 1912, and the first 14 miles of the entire length of 31 miles were reconstructed during January, February, and March of 1914. This work consisted of building a new intake above what is known as the Mexican Dam; the lining with concrete of the portion within the city limits of El Paso; the enlargement of the 10-mile earth section from El Paso to Ysleta; and the construction of a number of concrete bridges and water structures. The capacity of the canal was enlarged for this distance from 175 second-feet to 450 second-feet. The work was authorized on December 20, 1913, and was commenced on December 27. On January 10 there were 1,000 men employed and 700 head of animals. Water was turned through the reconstructed portion of the canal on March 23, 1914. In the intervening time 285,000 cubic yards of earth were excavated and 7,148 cubic yards of concrete placed, the latter including 325,400 square feet of canal lining. Forty-eight structures were built, which include 5 gate structures, 9 highway bridges, 17 timber-steel bridges, 94 timber turnouts, and a number of miscellaneous structures.

SURVEYS.

Farm and topographic surveys were completed in the Rincon and the Mesilla Valleys during 1913. Canal-location surveys were continued in the Mesilla Valley and a number of plans for various canal routes presented to a board of engineers convened in El Paso in December, 1913. This board recommended the construction of a low-line, or valley, canal throughout the project, rejecting, for the time being at least, the route of what is known as the high-line canal. The main canals in the Mesilla Valley were later located and estimates made to cover the cost of excavation and structures for these canals, as well as the proposed Mesilla diversion dam a few miles southwest of Las Cruces.

In the El Paso Valley the farm survey was begun during the spring of 1914, and in the Mesilla Valley considerable field work was undertaken to obtain data concerning plans and profiles of community ditches. In the Las Cruces and El Paso offices studies were continued on structures and various canal routes.

OPERATION AND MAINTENANCE.

The diversion dam and main canal of the Leasburg unit were operated during the year, supplying water to the three principal community ditches in the upper Mesilla Valley. The annual contract between the Government and the Elephant Butte Water Users' Association for the delivery of water was renewed.

The Franklin Canal, after its reconstruction, was operated for its full length of 31 miles, delivering water to approximately 10,000 acres of the El Paso Valley land.

Under both canal systems 27,723 acres were irrigated, with a use of water of 4.3 acre-feet per acre. During the summer season of 1913

there was an unusually long period of water shortage, which resulted in a very small yield.

Historical review, Rio Grande project.

Item.	1909	1910	1911	1912	1913	1914 (to June 30).
Acreage for which service was prepared to supply water	25,000	25,000	26,000	25,000	35,000	40,000
Acreage irrigated	22,000	22,600	25,980	23,115	27,723	33,700
Miles of canal operated	6	6	6	6	37	37
Water diverted (acre-feet)	[1] 145,892	[1] 99,789.6	[1] 152,685	[1] 125,000	[1] 144,610	[1] 125,375
Water delivered per acre of land irrigated (acre-feet)	[1] 6.6	[1] 4.4	[1] 6	[1] 5.4	[1] 4.34	[1] 3.7

[1] At lateral head gates; service does not distribute water. Does not include scouring and silting water furnished free of charge.

SETTLEMENT.

Pending the completion of the storage unit very little increase in the irrigated area is expected, and no enlargement of the cultivated district has been noted. Water conditions during the season of 1913 were extremely bad, and until the storage dam is completed and the river flow regulated no extensions of the irrigated area are practical. The growth of the principal city and the small towns has increased, however.

A campaign of publicity inaugurated by the Elephant Butte Water Users' Association has resulted in a number of sales and attracted a large number of prospective settlers to the Mesilla Valley. The population on farms is equally divided between Mexicans and Americans.

Settlement data, Rio Grande project.

Item. [1]	1913	1914
1. Total number of farms in project	1,784	[2] 1,800
2. Population of (1)	6,947	[2] 7,000
3. Number of irrigated farms	1,784	[2] 1,800
4. Operated by owners	1,089	[2] 1,100
5. Operated by tenants	695	[2] 700
6. Population of (3)	6,497	[2] 7,000
7. Number of towns	27	[2] 27
8. Population of (7)	74,918	[2] 80,000
9. Total population in towns and on farms	81,865	[2] 87,000
10. Number of public schools	47	[2] 50
11. Number of churches	76	[2] 81
12. Number of banks	14	14
13. Total amount of capital stock	[2] $2,580,000	$2,645,000
14. Total amount of deposits	[2] $10,398,000	$11,653,000
15. Total number of depositors	[2] 40,000	45,784

[1] No data available prior to 1913. [2] Estimated.

PRINCIPAL CROPS.

The crops during the season of 1913, while below normal and previous years in quantity, returned to the farmers only a little less in money value. Alfalfa continued to be the principal crop, though the yield was only 50 per cent of the normal, due to late frosts and water shortage. Corn was grown on a substantial acreage, but this crop suffered more than any other from the lack of water. The

heavy snows on the drainage area are expected to furnish more water during 1914, and it is anticipated that all crops will return a better yield by reason of better water service.

The following tables show the crop results during 1913. The first table is a report from the lands furnished with water by the system operated by the Reclamation Service. The other table gives similar figures for the total area in the project irrigated in 1913, including lands under private canals not yet supplied or operated by the service.

Crop report, Rio Grande project, year of 1913.

(Lands irrigated from system operated by Reclamation Service.)

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa	19,524	Ton	41,129	2.1	$12.96	$533,148	$27.30
Alfalfa seed	54	Bushel	201	3.7	10.00	2,010	37.22
Barley	108	Bushel	1,324	12.3	.77	1,024	9.50
Beans	472	Bushel	1,248	2.6	2.44	3,045	6.45
Canteloupes	351	Pound	1,068,950	3,045	.013	13,784	39.30
Corn, Indian	2,923	Bushel	19,615	6.7	1.10	21,662	7.41
Corn fodder	20	Ton	30	1.5	12.00	360	18.00
Miscellaneous fodder and hay	1,047	Ton	1,177	1.12	9.85	11,113	10.60
Garden	644					41,382	64.30
Grapes	94	Pound	38,720	412	.033	1,262	13.44
Oats	808	Bushel	20,943	25.9	.60	12,566	15.57
Orchard	329	Pound	533,372	1,621	.03	16,263	49.50
Pasture	146					1,780	12.19
Wheat	1,540	Bushel	20,313	13.2	.98	19,872	12.91
Less duplicated areas	1,340						
Total	26,720					679,271	25.40
Irrigated, no crops:							
Young orchard	1,003						
Total irrigated	27,723						

Areas.	Acres.	Number of farms.
Total irrigable area, farms reported	41,206	799
Total irrigated area, farms reported	27,723	799
Under rental contracts	27,723	799
Total cropped area, farms reported	26,720	799

Crop report entire Rio Grande project, year of 1913.

(Including lands under private canals.)

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa	39,684	Ton	83,636	2.09	$12.77	$1,067,673	$26.81
Alfalfa seed	54	Bushel	201	3.72	10.00	2,010	37.22
Barley	443	Bushel	4,671	10.54	.73	3,390	7.65
Beans	1,645	Bushel	7,765	4.72	2.42	18,685	11.36
Cantaloupes	358	Crate	21,379	59.7	.64	13,784	38.50
Corn, Indian	11,852	Bushel	144,641	12.2	1.10	159,190	13.43
Corn fodder	20	Ton	30	1.5	12.00	360	18.00
Miscellaneous fodder and hay	1,301	Ton	1,905	1.47	8.85	16,852	12.95
Garden	1,419	Acre				63,989	45.10
Grapes	134	Pound	72,120	538.2	.031	2,264	16.90
Oats	1,188	Bushel	32,273	27.3	.60	19,380	16.31
Orchard	991	Pound	1,677,812	1,693	.028	47,411	47.86
Pasture	146	Acre				1,780	12.20
Wheat	5,680	Bushel	85,409	15.0	.99	84,707	14.90
Less duplicated areas	1,396						
Total	63,519					1,501,475	23.64
Irrigated, no crop:							
Young orchard	1,151						
Total irrigated	64,670						

Areas.	Acres.	Number of farms.
Total irrigable area, farms reported	85,756	1,784
Total irrigated area, farms reported	64,670	1,784
Under rental contracts	27,723	799
Total cropped area, farms reported	63,519	1,784

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Rio Grande project (exclusive of Elephant Butte storage), to June 30, 1914.

ASSETS.

Inventories:		
Animals	$8,140.35	
Mechanical and other equipment	19,003.79	
Material and supplies on hand in storehouses	11,128.45	
Unadjusted transfers between projects	[1] 27.50	
Undistributed cost (freight and handling on inventory property)	1,487.01	
Total		$39,732.10

Construction work in process:			
Gross expenditures for construction of project to date		$872,162.48	
Less revenue earned during construction, as follows:			
Rentals of cottages	$123.33		
Rentals of irrigation water	101,138.71		
Loss on mess houses	[1] 1,800.25		
Profits on hospitals	2,895.45		
Contractors' freight refunds	2,114.34		
Adjustments—			
Depreciation on plant and equipment	2,450.75		
Profits shown on Government animals	2,682.37		
Total deductions		$109,604.70	
Net expenditures for construction of project to date			$762,557.78
Total assets			802,289.88

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		7,497.46	
Unpaid purchases		1,884.40	
Unpaid freight and express charges		5,477.97	
Unpaid passenger fares		93.30	
Total			14,953.13
Net investment:			
Disbursements	$882,743.48		
Transfers received from other projects	48,655.59		
		931,399.07	
Less—			
Collections	120,198.87		
Transfers issued to other projects	23,863.45		
		144,062.32	
Total			787,336.75
Total liabilities, reserves, and capital investment of the Government			802,289.88

Functional feature costs of Rio Grande project (exclusive of Elephant Butte storage) to June 30, 1914.

Carriage system	$634,113.05
Distribution system	37,419.19
Drainage and flood protection system	6,561.87
Roads and bridges	49,024.85
Miscellaneous preliminary investigations	82,370.73
Operation and maintenance during construction	62,459.16
Cost ledger inventories	213.63
Gross expenditures for construction of project to date	872,162.48

[1] Deduct.

Estimated cost of contemplated work, Rio Grande project (exclusive of Elephant Butte storage), during fiscal year 1915.

Carriage system:		
Rincon Valley—		
Surveys for diversion dam and main canal and surveys of community ditches	$20,000	
Mesilla Valley—		
Construction Mesilla Dam and main canals	283,500	
Surveys for main laterals and surveys of community ditches	20,000	
El Paso Valley—		
To complete reconstruction of Franklin Canal	130,000	
Main laterals (feed canal for San Elizario and Socorro communities)	30,000	
Surveys of community canals	10,000	
		$493,500
Drainage and flood protection:		
Mesilla Valley—		
Survey of river	2,500	
Survey for main drainage canal	2,500	
El Paso Valley—		
Survey of river	2,500	
Survey for main drainage canal	2,500	
		10,000
Farm-unit subdivisions: Survey of farm properties in Rincon, Mesilla, and El Paso Valleys		10,000
Roads and bridges		10,000
Miscellaneous preliminary investigations: Investigations at San Marcial, silt and water tests at Las Cruces and El Paso, stream gauging, duty of water, canal gauging, and work in San Luis Valley		30,000
Operation and maintenance (during construction)		45,000
Cost ledger inventories		50,000
Total		648,500

FINANCIAL STATEMENT.

Assets, liabilities, reserves, and capital, Elephant Butte storage, June 30, 1914.

ASSETS.

Cash in fiscal agent's possession awaiting remittance		$5,645.27
Accounts receivable, uncollected miscellaneous items		5.75
Inventories:		
Mercantile store stock on hand	$36,800.00	
Mechanical and other equipment	190,999.85	
Animals	2,218.20	
Material and supplies on hand in storehouse	133,472.64	
Goods in transit	10,367.60	
Unadjusted transfers between projects	3.84	
Undistributed cost (freight and handling on inventory property)	4,923.89	
		378,786.02

Construction work in process:			
Gross expenditures for construction of project to date		$3,306,920.05	
Less revenue earned during construction as follows:			
Rentals of cottages	[1] $5,969.87		
Rentals of power and light	2,059.02		
Miscellaneous revenues	3,018.07		
Profits on mess houses	5,009.63		
Profits on mercantile stores	44,193.98		
Profits on hospital	778.31		
Contractors' freight refunds	2,058.43		
Forfeitures by defaulting bidders and contractors	1,823.43		
Adjustments—			
Depreciation on plant and equipment	451,848.04		
Profits shown on Government animals	882.35		
Total deductions		505,701.39	
Net expenditures for construction of project to date			$2,801,218.66
Total assets			3,185,655.70

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$31,568.63	
Unpaid purchases		53,538.90	
Unpaid contract holdbacks		4,749.40	
Unpaid freight and express charges		97,428.69	
Unpaid passenger fares		234.00	
Unpaid agreements to purchase real estate		11,662.55	
Unredeemed coupon books		867.30	
Unpaid miscellaneous		6,071.20	
Total			206,120.67
Net investment:			
Disbursements	$3,014,678.61		
Transfers received from other projects	152,510.35		
		3,167,188.96	
Less—			
Collections	142,448.63		
Transfers issued to other projects	45,205.30		
		187,653.93	
Total			2,979,535.03
Total liabilities, reserves, and capital investment of the Government			3,185,655.70

Functional feature costs of Elephant Butte storage project to June 30, 1914.

Development (storage) works	$3,277,472.23
Cost ledger inventories	29,447.82
Gross expenditures for construction of project to date	3,306,920.05

[1] Deduct.

Estimated cost of contemplated work, Elephant Butte storage project, during fiscal year 1915.

Development (storage) works:	
Camp roads	$11,850.00
Cofferdams and river diversion	1,000.00
Excavation for foundations	200,000.00
Masonry for dam	856,900.00
Gates and sluiceways	220,000.00
Spillway	10,000,00
Earth dam at reservoir	200,000.00
Real estate and rights of way	37,000.00
Construction plant	8,000.00
Camp buildings and grounds	250.00
Total	1,545,000.00

NORTH DAKOTA, NORTH DAKOTA PUMPING PROJECT.

W. S. ARTHUR, acting project manager, Williston, N. Dak.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

County: Williams.

Townships: 152 to 155 N., Rs. 100 to 104 W., fifth principal meridian.

Railroad: Great Northern.

Railroad stations and estimated population, January 1, 1914: Buford, 75; Trenton, 100; and Marley,[1] on Buford-Trenton unit, are small unincorporated villages. Williston, on the Williston unit, is an incorporated city of about 4,000 population.

WATER SUPPLY.

Source of water supply: Missouri River.

Area of drainage basin: 155,000 square miles.

Mean run-off of Missouri River, near Williston, May to October, 1905 to 1907: 15,000,000 acre-feet.

AGRICULTURAL CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: Buford-Trenton unit, 4,049 acres; Williston unit, 8,189 acres.

Area under water-right applications and water-rental contracts to June 30, 1914; Williston, 2,076.82 acres; Buford-Trenton, 1,998.69 acres.

Area irrigated, season 1913: 1,739 acres on Williston unit. No part of the Buford-Trenton unit was irrigated. Area irrigated in 1914 to June 30: 300 acres.

Length of the irrigation season: 80 days, beginning from June 1 to June 15. Actual irrigation occurred in 1913 from June 5 to August 10.

Average elevation of irrigable area: 1,900 feet above sea level.

Average annual rainfall on irrigable area: 12 years, 13.56 inches; 1913, 14.28 inches. Above normal.

Range of temperature on irrigable area: —49° to 107° F.

Character of soil on irrigable area: Ranges from sandy loam to heavy clay gumbo.

Principal products: Alfalfa, grain, vegetables. Hogs will be one of the principal products in 1914.

Principal markets: Local, St. Paul, Minneapolis, Duluth, Chicago.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: Buford-Trenton unit, April 8, 1908; March 9, May 13, 1911; June 25, 1912; July 15, 1913; February 26, March 7, 1914. Williston unit, April 27, November 30, 1908; April 30, 1909; March 9, April 14, 1911; June 25, 1912; March 11, June 23, July 15, July 21, 1913; February 26, March 7, 1914.

Location of lands opened: Buford-Trenton unit, Tps. 152 and 153 N., Rs. 103 and 104 W., fifth principal meridian; Williston unit, Tps. 154 and 155 N., Rs. 100 and 101 W., fifth principal meridian.

Present status of irrigable lands: Buford-Trenton unit—288 acres entered subject to reclamation act; 251 acres open to entry; 91 acres of State lands; 3,420 acres in private ownership. Williston unit—54 acres entered subject to the reclamation act; 289 acres open to entry; 67 acres of State land; 7,779 acres in private ownership.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: Two acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $38 under public notices of 1908.

Annual operation and maintenance charge: 70 cents per acre of irrigable land and 50 cents per acre-foot of water actually used under public notices of 1908; $1.50 per acre of irrigable land and $1 per acre-foot of water used under order

[1] Less than 25.

of May 13, 1911. For season of 1914 the terms of the rental arrangement are $1 per acre, including 1 acre-foot of water, and $1 per acre-foot for water delivered in excess of 1 acre-foot per acre.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers September 22, 1905.
Construction authorized by Secretary January 23, 1906.
First division, Buford-Trenton unit, completed November, 1907.
Power and pumping plants, Williston unit, completed for present use in the fall of 1907; first division completed in the spring of 1908.
Pumping plant and transmission lines, Buford-Trenton unit, completed for present use in the spring of 1908.
First irrigation by Reclamation Service, season of 1908.
Buford-Trenton unit 38 per cent completed June 30, 1914; Williston unit 64 per cent completed June 30, 1914.
Entire project 50 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the North Dakota pumping project provides for a central steam-power plant located near Williston, operating pumps and generating electricity for the operation of other pumps on the Buford-Trenton and Williston units. On the Buford-Trenton unit water is pumped from a barge into a settling basin 30 feet above the river, and is then lifted by a permanent pumping station into a canal 50 feet above the settling basin for the irrigation of bench lands near Buford. A transmissoin line, 28.3 miles in length, delivers power for the operation of the pumps. The plan of the Williston unit provides for a series of motor-driven centrifugal pumps on a barge in the Missouri River, a settling basin receiving the water from the barge, and a main canal of 90 second-feet capacity extending along Little Muddy Creek to the power plant, where two sets of steam-driven turbines operate centrifugal pumps to lift water 51 feet into E Canal. From the main canal, about midway between the river and the power plant, electrically driven pumps raise 35 second-feet 28 feet into B Canal, and from this canal 20 second-feet are raised an additional 28 feet into C Canal. The main power station is located close to a 9-foot vein of lignite coal, from which fuel is obtained.

The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan which have been completed are: The central power station, coal mine, and transmission lines; at Buford-Trenton unit, two pumping stations, settling basin, and canal system; at Williston unit, four pumping stations, two settling basins, and canal system. No construction work is in progress at the present time.

Features remaining for future construction are the enlargement of the power house and installation of additional machinery; at Buford-Trenton unit, extension of Highline Canal and construction of Lowline Canal and laterals for irrigation of bottom lands; at Williston unit, construction of east and west bottom canal systems, with additional intake and pumping stations.

CONSTRUCTION DURING FISCAL YEAR.

No construction work, properly so classed, was undertaken during the fiscal year, except an extension of 2,125 feet to E Canal and 800 feet to B–03–1 lateral. These are 5-second-feet ditches that were extended to reach new farm units which had never before been irrigated. Because of the small amount of work and its location, it was necessarily done with slip scrapers and shovels at higher unit cost than would have resulted if the work were part of some larger job and done under more favorable conditions. The total yardage was 672, and the total cost, $192.27; unit cost per yard, 30 cents.

OPERATION AND MAINTENANCE.

During the irrigation season of 1913, subsequent to June 30, the power plant, coal mine, transmission line, the Williston barge pump-

ing station, pumping stations No. 2 and No. 4, settling basin, and 32 miles of canal were operated. No features of the Buford-Trenton unit were operated.

Of the total irrigable area of the Williston unit 2,951.36 acres, or 36 per cent, qualified to receive water. Of this, 1,739 acres, or 59 per cent, were actually irrigated. This was 21 per cent of the total irrigable area of the Williston unit. On the Williston unit 54 farms were irrigated, not including agricultural tracts of 1 acre or less, not classed as farms. The amount of water supplied to the land was 2,287.7 acre-feet, or an average of 1.31 acre-feet per acre irrigated.

During the year 8,575.87 tons of coal were mined for consumption in the power plant at an average unit cost of $1.407 per ton.

During the irrigation season not more than four boilers, or half the capacity of the central power station, were in use at any time. This was when the irrigation of alfalfa was at its height. The central power station and pumping barge were operated 55 days; pumping substation No. 2, 41 days; and pumping substation No. 4, 41 days out of the irrigation season of 80 days, demonstrating that a much larger area could be irrigated in the 80-day season of regulated deliveries.

The irrigation season of 1914 began June 1 and up to the end of the fiscal year 494 acre-feet of water were pumped and delivered to 300 acres of land, which were actually irrigated. The last month of the fiscal year, which was the first month of the irrigation season, has been the wettest, with one exception, in the 43 years that weather records have been made for this section. Irrigation to the close of the fiscal year has been very light. Before the close of the season the irrigated area will doubtless be largely increased, since the area on which payments have been made is in excess of that of any previous year on the same date.

Historical review, North Dakota Pumping project.

WILLISTON UNIT.

Item.	1909	1910	1911	1912	1913	1914 (to June 30).
Area for which service was prepared to supply water	8,189.31	8,189.31	8,189.31	8,189.31	8,189.31	8,189.31
Acreage irrigated	1,450	1,403	2,426	323	1,739	300
Number of farms irrigated	45	43	77	16	54	24
Miles of canal operated	28	32	37	18	32	30
Water diverted (acre-feet)	3,912.10	4,765.74	4,299.70	750.32	3,637.74	800
Water delivered to land (acre-feet)	2,225	2,379	2,952	278	2,287.70	494
Water per acre of land irrigated (acre-feet)	1.54	1.69	1.22	0.86	1.31	1.64

BUFORD-TRENTON UNIT.

Area for which service was prepared to supply water	4,049	4,049	4,049	4,049	4,049	4,049
Acreage irrigated	159	457	1,163			
Number of farms irrigated	3	10	21			
Miles of canal operated	6.5	8	12.75			
Water delivered to land (acre-feet)	232	662	1,472			
Water per acre of land irrigated (acre-feet)	1.46	1.45	1.27			

During the entire year some portion of the power plant was in operation to furnish power in excess of the requirements of the project to the city of Williston, in accordance with contract executed in December, 1912.

The energy delivered to the city during the fiscal year was 436,300 kilowatt hours. During this period only 12 interruptions occurred, the longest being 8 hours and 25 minutes, and all except 5 were by request of the city authorities to permit of changes in the city's distribution system or correction of trouble. The following is a statement of results of the operation of this contract for the fiscal year:

Sale of commercial power, North Dakota Pumping project.

Year and month.	Cost.		Collections.		Profit.	
	This month.	Total to date.	This month.	Total to date.	This month.	Total to date.
1913.						
July	$701.06	$9,923.05	$1,158.75	$10,431.70	$457.69	$508.65
August	861.72	10,784.77	1,271.25	11,702.95	409.53	918.18
September	1,807.89	12,592.66	1,500.00	13,202.95	[1] 307.89	610.29
October	1,975.04	14,567.70	1,689.00	14,891.95	[1] 286.04	324.25
November	1,819.40	16,387.10	1,863.75	16,755.70	44.35	368.60
December	1,764.66	18,151.76	1,970.00	18,725.70	205.34	573.94
1914.						
January	1,785.53	19,937.29	1,833.75	20,559.45	48.22	622.16
February	1,745.70	21,682.99	1,554.00	22,113.45	[1] 191.70	430.46
March	1,770.60	23,453.59	1,549.50	23,662.95	[1] 221.10	209.36
April	1,966.54	25,420.13	1,500.00	25,162.95	[1] 466.54	[1] 257.18
May	1,743.77	27,163.90	1,500.00	26,662.95	[1] 243.77	[1] 500.95
June [2]	600.00	27,713.90	1,285.00	27,947.95	685.00	184.05

[1] Loss. [2] Estimated.

In addition to the above gain, the contract returned during the fiscal year $1,160.05 of the cost of preparing the plant for winter operation and $2,063.20 plant depreciation.

During the first six months of 1914 the increase in consumption of electrical energy by the city of Williston was 26 per cent over that for the same period of 1913. In 1915 the minimum monthly payment guaranteed by the city, except during the irrigation season, is $1,800, instead of $1,500 as during the current year. This item and the normal increase of a growing community will make the contract a large factor in the ultimate success of the project. Changes in its water and pumping system, within approximately three months, will increase the city's consumption of electrical energy by 80,000 to 100,000 kilowatt hours, or 20 to 25 per cent.

SETTLEMENT.

A small improvement in settlement conditions was made during the fiscal year, due to transfers of land to persons who will live upon it and engage in intensive agriculture or stock raising. These changes, though too small to record in tabular form, mark the beginning of a new era on the project, for there were 47 per cent more cows, 180 per cent more hogs, and 10 times more corn on the project on June 30, 1914, than at any other time in its history. Fully 50 per cent of the land, both irrigated and unirrigated, is owned by persons nonresident upon the land, but these are taking note of the course of development along new lines and are seeking renters or putting their lands into alfalfa.

Three farmers' clubs are organized on the project, a breeders' association and a cooperative creamery have been organized, and a building is being erected for the latter. A firm established itself in Williston during the last month of the year to buy and market farm products. These are results of the development of the project and have not come in advance of their requirement.

Settlement data, North Dakota Pumping project.

WILLISTON UNIT.

Item.	1912.	1913.	1914.
1. Total number of farms on project	93	101	101
2. Population of (1)	172	146	146
3. Number of irrigated farms	16	54	26
4. Number operated by owners or managers	8	32	18
5. Number operated by tenants	8	22	8
6. Population of (3)	48	162	72
7. Number of towns	2	2	2
8. Population of (7)	4,700	4,700	4,700
9. Total population in towns and on farms (sum of (2) and (8))	4,872	4,846	4,846
10. Number of public schools	4	4	4
11. Number of churches	5	5	5
12. Number of banks	5	3	3
13. Total capital stock			$135,000
14. Total amount of deposits			$1,297,000
15. Total number of depositors			4,900

BUFORD-TRENTON UNIT.

1. Total number of farms on	34	38	42
2. Population of (1)	53	69	70
3. Number of irrigated farms			
4. Number operated by owners or managers	19	19	19
5. Tenants, number operated by them	2	23	23
6. Population of (3)			
7. Number of towns	2	2	2
8. Population of (7)	350	350	350
9. Total population in towns and on farms (sum of (2) and (8))	403	419	420
10. Number of public schools	1	1	1
11. Number of churches	2	2	2
12. Number of banks	1	1	1
13. Total capital stock	$10,000	$10,000	$10,000
14. Total amount of deposits	(1)	(1)	$100,000
15. Total number of depositors	(1)	(1)	200

[1] Not available.

PRINCIPAL CROPS.

Alfalfa continues to be the principal crop and new acreage is added each year. Of the 1,739 acres actually irrigated in 1913, over 1,000 were in alfalfa. Although a large portion was injured by hail and practically all suffered from nonirrigation in 1912, the yield was $24.90 per acre cropped. In 1913 there was no marked increase of any crop, but in 1914 prior to June 30 there was a marked increase in alfalfa, corn, and potatoes, the acreage in corn being about 10 times that of any previous year. This is a natural result of the interest just awakening in cattle and hogs.

The following tables show the crop results of 1913 on the irrigated and dry-farmed portions of the project. It is notable that the irrigated lands returned about three times the value per acre secured from the unirrigated crops.

Crop report, unirrigated lands, North Dakota Pumping project, Williston unit, year of 1913.

Crop.	Area acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa (old)	1,064	Ton	2,040.4	1.92	$13.00	$26,525	$24.90
Alfalfa (damaged)	28	Ton	23	.82	4.00	92	3.29
Alfalfa seed	33	Bushel	3	1.2	12.00	36	14.40
Barley	141	Bushel	3,130.9	22.2	.40	1,252	8.90
Beans	.5	Bushel	12	24	3.00	36	72.00
Celery	.5	Bushel				600	1,200.00
Cabbage	2	Ton	11	5.5	80.00	880	440.00
Corn, sweet	1.25	Dozen				95	76.00
Corn, Northwest Dent	4	Bushel	78.5	19.6	.55	43	10.79
Cucumbers	.25					10	40.00
Flax	30	Bushel	540	18	1.20	648	21.60
Hay, except above	83	Ton	53	.64	10.00	530	6.40
Oats	131	Bushel	3,984.8	30.4	.35	1,395	10.65
Onions [1]	3					530	192.80
Potatoes	45	Bushel	5,523.6	122	.65	3,590	78.94
Peas, field	3	Bushel					
Peas, garden [2]	.25					40	160.00
Pasture	19					113	5.95
Strawberries	.50	Quart	300	600	.20	60	120.00
Tomatoes [3]	1.25					575	460.00
Truck	21					925	44.60
Wheat	105	Bushel	1,303.6	12.4	.70	913	8.67
Total	1,686					38,888	23.06
Irrigated, no crop:							
Young alfalfa	98						
Miscellaneous	53						
Less duplicated areas	98						
Total	53						
Total irrigated	1,739						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	2,951.36	54
Total irrigated area farms reported	1,739.00	54
Under water-right applications	1,739.00	54
Total cropped area farms reported	1,685.8	54

[1] Yield not known. Sold from 4 to 10 cents per pound.
[2] No record kept of yield.
[3] 15 cents per pound to $1\frac{2}{3}$ cents per pound.

Crop report, unirrigated lands, North Dakota pumping project, Williston unit, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa (old)	127	Ton	96.5	0.76	$13.00	$1,255	$9.90
Alfalfa seed	30	Bushel	19	.63	12.00	228	7.60
Barley	215	Bushel	3,854	17.9	.40	1,542	7.17
Beans	2	Bushel	22	11	3.00	66	33.00
Flax	28	Bushel	175	6.25	1.20	210	7.50
Hay	575	Ton	257.5	.448	10.00	2,575	4.48
Oats	146	Bushel	3,643	25	.35	1,275	8.73
Pasture	84					173	2.06
Peas [1]	3					10	4.00
Potatoes	35	Bushel	1,500	43.5	.65	975	28.25
Rye	8	Bushel	64	8	.60	38	4.80
Truck	2					100	50.00
Wheat	598	Bushel	6,413.3	10.72	.70	4,489	7.50
Total cropped	1,853					12,936	6.98

[1] Fed on vines.

Crop report, unirrigated lands, North Dakota Pumping project, Buford-Trenton unit, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa (old)	78	Ton	68.5	0.9	$13.00	$890.50	$11.42
Alfalfa seed	20	Bushel	25	1.25	12.00	300.00	15.00
Barley	142	Bushel	2,295	16.2	.40	918.00	6.47
Corn	5	Bushel	50	10	.55	27.50	5.50
Flax	96	Bushel	582	6	1.20	698.40	7.27
Oats	105	Bushel	2,376	22.6	.35	831.60	7.92
Wheat	809	Bushel	8,410	10.4	.70	5,887.00	7.28
Total cropped	1,255					9,553.00	7.61

ORDER DATED MARCH 7, 1914.

Whereas the public notices issued in April, 1908, opening to irrigation lands under the Buford-Trenton and Williston projects, North Dakota, required payment to be made in 10 equal annual installments, and it was later found necessary to grant a stay of proceedings looking to cancellation for failure to make the payments when due; and

Whereas in March and April, 1911, orders were issued announcing the terms under which water would be rented in 1911, 1912, and 1913, but it was found that a number of settlers were financially unable to pay the charges announced, and orders were later issued extending the time of payment; and

Whereas notwithstanding the allowance of such stay of proceedings and the furnishing of water on easier terms of payment, a large number of the water users are delinquent in payments and their water-right applications subject to cancellation:

Now, therefore, in pursuance of the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, it is hereby ordered—

1. Water will be furnished in 1914 to all irrigable lands, under the Williston unit, the entrymen or owners of which shall have executed acceptances and made payments as hereinafter prescribed. The pumping barge for the Buford-Trenton unit will be launched in 1914, providing acceptances as hereinafter prescribed are presented and payments made before April 15, 1914, covering at least 1,000 acres of irrigable land.

2. The operation of the pumps will be planned with a view to an approximately uniform rate of pumping the water and for adequate irrigation in the shortest practicable operating period with an appropriate regulation of deliveries for each tract irrigated. The operating period shall be for an irrigating season of 80 days, beginning not earlier than June 1 and not later than June 15 and closing not earlier than August 19 and not later than September 2 of each year.

3. All entrymen and water-right applicants who find themselves unable to meet the conditions of public notices heretofore issued may, by acceptance of the provisions of this order and subject to its provisions, obtain a supply of water for the irrigation of their lands in the season of 1914 and thereafter until further notice on a rental basis of $1 per irrigable acre for the irrigation season, payment of 50 cents

per acre on account thereof to be made at the time such acceptance is filed, and the balance will be due December 1, 1914; such acceptance and payment will entitle a water user to not to exceed 1 acre-foot per acre of irrigable land, and additional water may, if required for the proper irrigation of the land, be obtained at the rate of $1 per acre-foot, due December 1, 1914. The portion of the charge due December 1 shall bear interest at 1 per cent per month from the due date until paid.

4. All entrymen or landholders who shall, during the irrigation season of 1914, file with the project manager, Williston, N. Dak., a written acceptance of the terms and conditions of this order upon the form hereto attached and comply with the payment, cultivation, and other requirements hereof shall thereby secure a stay of proceedings looking to the cancellation of their entries or water-right applications for failure to make payments when due, such stay of proceedings to remain in effect until further announcement by public notice or otherwise.

5. The acceptance of the terms of this order shall be subject to the provisions of such public notices and orders as may be hereafter issued affecting such lands; but nothing herein contained shall prevent any water user from securing the benefits of any laws which may be hereafter enacted affecting the operations under the reclamation law.

6. All entrymen and water-right applicants who are now in good standing in the matter of payments of water-right charges and all those who on or before May 1, 1914, shall make the necessary payments thereunder may, if they so desire, continue under present contracts and the public notices and orders heretofore issued.

ANDRIEUS A. JONES,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, North Dakota Pumping project, to June 30, 1914.

ASSETS.

Cash in other employees' hands awaiting transfer to fiscal agent		$2.95
Accounts receivable:		
Uncollected miscellaneous items	$1,289.25	
Construction charges due and uncollected from water-right applicants	74,513.01	
Operation and maintenance charges due and uncollected from water-right applicants	33,786.96	
Total		109,589.22
Inventories:		
Mercantile stores stock on hand	952.49	
Animals	890.83	
Mechanical and other equipment	10,221.81	
Material and supplies on hand in storehouses	6,497.22	
Undisturbed cost (freight and handling on inventory property)	269.29	
Total		18,831.64
Construction work in process:		
Gross expenditures for construction of project to date	713,151.48	

Construction work in process—Continued.			
Less revenue earned during construction as follows:			
Rentals of grazing lands	$347.16		
Rentals of irrigation water	196.75		
Profits on mess houses	356.45		
Profits on mercantile stores	1,499.82		
Profits on hospitals	149.12		
Contractors' freight refunds	5,495.08		
Adjustments—			
Depreciation on plant and equipment	11,891.65		
Profits shown on Government animals	477.60		
Total deductions		$20,413.63	
Net expenditures for construction of project to date			$692,737.85
Deferred operation and maintenance charges			202,561.17
Total assets			1,023,722.83

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		2,421.74	
Unpaid purchases		995.88	
Unpaid freight and express charges		1,368.00	
Unpaid passenger fares		5.00	
Unredeemed coupon books		34.25	
Total			$4,824.87
Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		80,883.54	
Construction charges paid in advance by water-right applicants		30.40	
Construction charges paid and forfeited by water-right applicants		152.00	
Total			81,065.94
Net investment:			
Disbursements	$983,080.51		
Transfers received from other projects	193,454.11		
		1,176,534.62	
Less—			
Collections	56,044.96		
Transfers issued to other projects	182,657.64		
		238,702.60	
Total			937,832.02
Total liabilities, reserves, and capital investment of the Government			1,023,722.83

Functional feature costs of North Dakota Pumping project to June 30, 1914.

Carriage system	$73,187.31
Distribution system	102,697.38
Drainage and flood protection system	15,679.88
Power system	450,045.34
Real estate	14,056.41
Telephone lines	2,704.14
Farm-unit subdivisions	12,803.20

Roads and bridges	$4,079.93
Miscellaneous preliminary investigations	37,897.89
Gross expenditures for construction of project to date	713,151.48

Operating revenues and expenses, North Dakota Pumping project, to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$206,242.79
Maintenance	42,346.02
Carriage system:	
Operation	46.30
Maintenance	571.47
Distribution system:	
Operation	22,301.36
Maintenance	8,133.73
Undistributed expenses:	
Operation	39.43
Maintenance	84.65
Total	279,765.75

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	46,654.86
Operation and maintenance charges paid in advance by water-right applicants	.40
Operation and maintenance charges paid and forfeited by water-right applicants	74.70
Rentals of lands and buildings	1,265.64
Rentals of power and light	27,952.20
Rentals of irrigation water	1,109.41
Miscellaneous revenues	147.37
Deferred operation and maintenance revenues (carried to debit side of assets and liabilities statement)	202,561.17
Total	279,765.75

Estimated cost of contemplated work, North Dakota Pumping project, during fiscal year 1915.

Development (storage) works:		
Williston pumping station No. 2	$308.00	
Williston pumping station No. 3	2,192.50	
Williston pumping station No. 4	278.32	
Buford-Trenton pumping station No. 1	869.23	
Buford-Trenton pumping station No. 2	938.45	
		$4,586.00
Carriage system:		
Williston main-supply Canal A	5,206.00	
Buford-Trenton main-supply Canal A	13,193.00	
		18,399.00
Distribution system:		
Williston distributing system	2,152.45	
Buford-Trenton distributing system	599.55	
		2,752.00
Power system, Buford-Trenton transmission line		39,682.00
Real estate, buildings		1,488.00
Telephone lines		346.00
Total		67,253.00

OKLAHOMA, LAWTON PROJECT.

P. M. Fogg, project manager, Lawton, Okla.

(For *Data for Complete Project*, see appendix.)

LOCATION.

County: Comanche.
Townships: 2 and 3 N., Rs. 12 and 13 W., Indian meridian.
Railroads: St. Louis & San Francisco; Chicago, Rock Island and Pacific.
Railroad stations and population, January 1, 1914: Lawton, Okla., 8,000.

WATER SUPPLY.

Source of water supply: Medicine Bluff and Little Medicine Bluff creeks.
Area of drainage basin: 110 square miles.
Annual run-off in acre-feet of Medicine Bluff and Little Medicine Bluff creeks at site of proposed diversion dam: Medicine Bluff Creek, including the run-off of Little Medicine Bluff Creek and the overflow from Lake Law-ton-ka, into which Medicine Bluff Creek flows, 1913, 25,200 acre-feet. The estimated natural run-off of Medicine Bluff Creek is 31,300 acre-feet, which includes the run-off at the proposed diversion dam plus the amount of water used by the city of Lawton and Fort Sill and the evaporation on the reservoir. A study of the run-off records furnished by the United States Geological Survey shows that approximately 21,000 acre-feet of the total for the year 1913 occurred during November and December. A study of the rainfall records for that section shows that for these two months the record was abnormally large, and that the total for the year 1913 was also exceptionally large, being 42.48 inches, or 11 inches above the average yearly rainfall.
Reservoir: Storage capacity of top 20 feet of Lake Law-ton-ka, which was built by the city of Lawton, Okla., for domestic use. The reservoir has a total capacity of 14,000 acre-feet and covers an area of 1,082 acres. The reservoir is formed by a 50-foot masonry dam, which stores the waters of Medicine Bluff Creek, and it is estimated that the capacity of the top 20 feet, which the city of Lawton agreed to donate to the Government, is 12,000 acre-feet.
Irrigable area: Approximately 2,500 acres under present plan.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Length of irrigation season: April 1 to October 31—214 days.
Average elevation of irrigable area: 1,100 feet above sea level.
Average annual rainfall on irrigable area: 30 years, 31 inches; at Lake Law-ton-ka, 1913, 36.58 inches; at Lawton, Okla., 1913, 42.48 inches.
Range of temperature on irrigable area: 10° to 110°.
Character of soil of irrigable area: Clay loam; rolling.
Principal products: Garden truck, melons, tomatoes, cabbage, onions, sweet potatoes, berries, fruit, forage crops, and cotton.
Principal markets: Lawton and Oklahoma City, Okla.; Kansas City and St. Louis, Mo.; Galveston, Tex.; and New Orleans, La.

CHRONOLOGICAL SUMMARY.

Reconnoissance authorized by Secretary April 29, 1912.
Reconnoissance begun June 12, 1912.
Gauging stations established at Lake Law-ton-ka and on Medicine Bluff Creek in summer of 1912, evaporation raft placed on Lake Law-ton-ka same summer, and arrangements made with United States Geological Survey to make measurements of rainfall and evaporation on the reservoir and run-off measurements

of Medicine Bluff Creek. Two gauges were established, one at Medicine Bluff Creek at site of diversion dam below where Little Medicine Bluff Creek enters Medicine Bluff Creek and one on Little Medicine Bluff Creek, thus securing run-off consisting of flow of Little Medicine Bluff Creek and overflow from the reservoir into which Medicine Bluff Creek flows.

Reconnoissance investigations carried on by Mr. Ernest McCulloh during summer of 1912.

Department approved allotment of $100,000 on January 24, 1914, for the construction of this project after certain conditions imposed by Secretary Lane had been complied with, these requiring the forming of an acceptable water users' association, the subscribing of 2,500 acres of irrigable land in a compact body, a part of this area, if possible, to be in public land or Indian land, and agreement for division of holdings into small farms.

IRRIGATION PLAN.

The irrigation plan for the Lawton project provides for the storage of the water of Medicine Bluff Creek in the Lawton Reservoir, or Lake Law-ton-ka, the top 20-foot capacity of which has been donated to the Government by the town of Lawton for this use, and the direct diversion of the water of Little Medicine Bluff Creek, a diversion dam in Medicine Bluff Creek and distribution of the water through a canal approximately 10 miles long, irrigating about 2,500 acres in the vicinity of Lawton, Okla. The area to be irrigated has not been definitely selected at this time, but will be adjacent to and include about 600 acres of Indian land north of Lawton.

FINANCIAL STATEMENT.

Assets, liabilities, reserves, and capital, Lawton project, to June 30, 1914.

ASSETS.

Construction work in process (gross expenditures for construction of project to date)	$450.65

LIABILITIES.

Net investment (disbursements)	450.65

Functional feature cost of Lawton project to June 30, 1914.

Miscellaneous preliminary investigations	$450.65

Estimated cost of contemplated work, Lawton project, during fiscal year 1915.

Development (storage) works		$5,000.00
Carriage system:		
Diversion dam and structures	$10,000.00	
Main canal and structures	79,549.35	
Inventories	2,000.00	
		91,549.35
Farm-unit subdivisions		3,000.00
Total		99,549.35

OREGON, COOPERATIVE WORK.

JOHN T. WHISTLER, engineer central Oregon investigations, Portland, Oreg.; L. F. HARZA, project manager, Columbia River power project, The Dalles, Oreg.

Deschutes Basin.—The field work for 1913 was confined entirely to investigations of Deschutes Basin above Crooked River. Three plane-table parties and land-classification men were in the field until winter on canal-line alternatives, land classification, and sketched topography of irrigable land.

A test-boring party, with one diamond drill and one Calyx shot drill, was in the field until late in the fall on alternative dam sites for Benham Falls Reservoir in townships 19, 20, 21, and 22 south, ranges 9, 10, and 11 east, Willamette meridian. Continuous bedrock was not encountered at any of the sites, but it is believed a satisfactory foundation exists for the comparatively low earth dam of approximately 65 feet that will be required to store the entire available run-off of Deschutes River.

The total irrigable area was reduced to about 165,000 acres, some of which, at least, may be considered practicable to serve at the present time. The south unit lands lie generally in townships 15, 16, 17, 18, and 19 south, ranges 13, 14, 15, and 16 east, the diversion for which would be in township 18 south, range 11 east. The total area is approximately 50,000 acres.

The West side unit lands lie in townships 13, 14, and 15 south, ranges 11 and 12 east. The diversion for this unit will be in township 16 south, range 12 east. The total area of approximately 20,000 acres lies north of the present state Tumalo project.

The North unit lies north of Crooked River and east of Deschutes River, in townships 9, 10, 11, 12, and 13 south, ranges 12, 13, and 14 east. The total area is approximately 100,000 acres. The diversion will be from the same point as for West unit, and water will be carried by a canal 18 miles long to Crooked River, crossing in township 14 south, range 13 east.

East side unit.—A proposal was made during the winter to have the Government take over the North Canal unit of the Central Oregon Irrigation Co., a Carey Act company, operating on the east side of Deschutes River and south of Crooked River, and an appraisal of the property was made in May of this year. During the winter and fore part of the present year, plans, studies, and estimates were made of the various features of the project and maps and manuscript prepared for a report to be published later.

Supplementary surveys are being made this year of Crane Prairie Reservoir site, in townships 20 and 21 south, ranges 7 and 8 east.

Malheur project.—A diamond-drill party has this season put down five holes, developing excellent foundation at a depth of from 7 to 11 feet for a Warm Springs Reservoir site, Malheur project, in townships 22 and 23 south, ranges 36 and 37 east. Reclassification of the lands within the reservoir showing improvements has also been made

and levels run connecting the datum up with United States Geological Survey datum.

John Day project.—A double plane table party has been, since the fore part of May, employed on topography survey of Clarno Reservoir site, in townships 7, 8, and 9 south, ranges 19 and 20 east.

Columbia River power project.—The Legislature of the State of Oregon, by act of March 4, 1913 (chapter 374 of the General Laws of Oregon for 1913), appropriated $15,000 for the investigation of the engineering and commercial feasibility of a power site on the Columbia River about 4 miles above The Dalles, Oreg., the location being known locally as Five Mile Rapids. This fund was placed in the hands of an investigating committee, two to be appointed from the senate by the president of that body, two to be appointed from the house by the speaker of that body, and the fifth member to be the State engineer. The committee as finally constituted is composed of I. N. Day and J. C. Smith, of the senate; J. D. Abbott and Vernon A. Forbes, of the House; and John H. Lewis, State engineer.

By provision of the bill this committee was given authority to enter into contract with the State of Washington, or the Federal Government, or both, for joint conduct of the investigation. Subsequently, upon the invitation of the committee, the Secretary of the Interior authorized the appropriation of an equal amount—$15,000—for the investigation, under a contract to be executed between E. G. Hopson, supervising engineer, Pacific district, United States Reclamation Service, acting for the United States, and the power project committee, acting for the State of Oregon. This agreement was duly executed under date of December 12, 1913, and provided for equal expenditures by the two parties to the investigation, the work to be carried out, however, through the organization of the Reclamation Service.

The work of the investigation was commenced February 1, 1914, and is still in progress. Topographic surveys and diamond-drill borings have been completed and office studies are in progress.

At the power site under investigation the Columbia River has a minimum flow of about 50,000 second-feet, and topographic conditions warrant the development of a head between 60 and 100 feet, depending upon relative economy, the head to be reduced during flood stages in any case to about 42 feet. For an intermediate choice of heads the total contemplated development would thus be about 300,000 horsepower.

In addition to the studies of the engineering feasibility and cost of the power development, investigations are being carried on to determine the amount of land which could be irrigated by pumping within a reasonable transmission distance of the project, and the cost of putting water upon these lands. Investigations are also being conducted to determine the possibility of disposing of the power which can not be used in pumping for irrigation for commercial uses in the chemical and metallurgical industries.

FINANCIAL STATEMENTS.

The assets and liabilities are shown in the financial statement for the secondary projects. The costs are given in the functional feature cost report which follows the above statement, and the net investment is given in Tables 11 and 12 in the appendix.

OREGON, UMATILLA PROJECT.

H. D. Newell, project manager, Hermiston, Oreg.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

County: Umatilla and Morrow.
Townships: 4 and 5 N., Rs. 24, 25, 26, 27, 28, and 29 E., Willamette meridian.
Railroads: Oregon-Washington Railroad & Navigation Co.; Northern Pacific.
Railroad stations and estimated population January 1, 1914: Hermiston, 600; Umatilla, 200.

WATER SUPPLY.

Source of water supply: Umatilla River.
Area of drainage basin: 1,610 square miles.
Annual run-off in acre-feet of Umatilla River at Yoakum (1,200 square miles) 1903 to 1913: Maximum, 723,000; minimum, 250,000; mean, 512,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1914: 17,500 acres.
Area under water-right applications, season of 1914: 13,452 acres.
Length of irrigation season: From March 20 to October 16—210 days.
Average elevation of irrigable area: 470 feet above sea level.
Average annual rainfall on irrigable area: 8.53 inches; 1913, 9.80 inches.
Range of temperature on irrigable area: —28° to 115° F. (ordinary minimum, 0° F.).
Character of soil irrigable area: Sandy loam and volcanic ash.
Principal products: Alfalfa, fruits, berries, vegetables.
Principal markets: Portland, Oreg., and Spokane, Wash.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: December 27, 1907; August 3, 1908; November 12, 1908; April 3, 1909; January 6, 1910 (two); February 28, 1911; May 16, 1911; March 2, 1912; May 8, 1912; March 3, 1913; April 7, 1913; June 23, 1913.
Location of lands opened: Tps. 4 and 5 N., Rs. 28 and 29 E., Willamette meridian.
Present status of irrigable area opened: 2,482 acres entered subject to reclamation act; 116 acres open to entry; 13,335 acres private lands.
Limit of area of farm units: Public, 40 acres; private, 160 acres.

Duty of water: 2.8 acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $60 and $70.
Annual operation and maintenance charge: $1.30 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers October 27, 1905.
Construction authorized by Secretary December 4, 1905.
Diversion dam and feed canal completed August, 1907.
Cold Springs Dam completed June, 1908.
First irrigation by Reclamation Service, season of 1908.
Construction of west extension authorized December 22, 1913.
Entire project (including west extension) 62.5 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Umatilla project provides for the diversion of water from the Umatilla River above Echo, Oreg., through a feed canal 24.5 miles long into a storage reservoir through an outlet canal; from the feed canal by means of a by-pass connecting the feed and outlet canals, and from the Umatilla River by the Maxwell Canal, heading near Butter Creek, into a distribution system watering land in the Umatilla and Columbia River valleys near Hermiston, Oreg. In addition, some 10,000 acres bordering the Columbia River in the vicinity of Umatilla and Irrigon, Oreg., will be watered by a canal diverting from the Umatilla River about halfway between Hermiston and Umatilla. The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating water arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law, heretofore made for the purpose of the project.

The features which have been completed are: The diversion works above Echo, feed canal, Cold Springs Dam, by-pass, diversion works for the Maxwell Canal, main distributary, laterals for the first, second, third, and fourth units; also distributary for the Umatilla unit to which water is being supplied on a rental basis. Four drain ditches have been built. The main construction work in progress is the building of the main distributary for the west extension.

CONSTRUCTION DURING FISCAL YEAR.

Feed canal.—Five thousand and fifty linear feet of 3-inch concrete side lining were placed near Echo, and the concrete controlling works were built by means of which water could be delivered to the Echo Flouring Mill. Eleven thousand eight hundred linear feet of the canal south and southeast of Hermiston were protected by a side lining of 2-inch mortar. The total length of full lining in the feed canal to June 30, 1914, was 8,800 linear feet; the total side and bottom lining 188 linear feet; and total length of side lining, 30,870 linear feet.

Distribution system.—Seven thousand two hundred linear feet of Canal A were protected by a side lining of 2-inch concrete, and 570 linear feet of Maxwell Canal were protected by a side lining of 1½-inch mortar. The foregoing involved the placing of 450 cubic yards of material. During the year 800 linear feet of 16-inch cement pipe were laid.

West extension.—On July 10, 1913, the Secretary of the Interior gave tentative approval of the west extension by authorizing a

10,000-acre unit conditioned upon satisfactory agreements being executed with the Oregon Land & Water Co. The proposed court order pledging the above holdings was approved by the Secretary November 7, 1913. On December 22, 1913, authority was received to begin grading on the main canal. Advertisements were promptly issued for necessary equipment and the work was begun early in January. Material moved to date comprises 160,000 cubic yards of earth, 24,000 cubic yards of indurated material, and 300 cubic yards of rock. On May 28 bids were opened for the construction of the diversion dam at Three Mile Falls.

OPERATION AND MAINTENANCE.

Diversion of water for the feed canal was resumed November 5, 1913, and was continued to May 19, 1914, 65,900 acre-feet being diverted from the river, and 47,600 acre-feet reaching the reservoir. Storage of 49,800 acre-feet was reached on March 20. After that date it was the endeavor to divert only enough water to make up for the draft and losses. The available storage on June 30, 1914, was 33,850 acre-feet. Delivery of water through the distribution system began on March 16, and the total discharge from the reservoir up to June 30 was 23,600 acre-feet. Delivery of water through the Maxwell Canal began on March 16, the total diversion to June 30 amounting to 11,800 acre-feet. The area of irrigable holdings during the present season is estimated to be 10,000 acres, the area actually irrigated at 5,500 acres.

Historical review, Umatilla project.

Item.	1909	1910	1911	1912	1913	1914[1]
Acreage for which service was prepared to supply water	11,325	15,276	17,252	17,252	18,300	17,587
Acreage irrigated	2,000	2,500	3,500	4,600	5,000	5,500
Miles of canal operated	90	112	112	112	112	112
Water diverted (acre-feet)	67,000	69,400	78,900	90,000	81,500	70,000
Water delivered to land (acre-feet)	16,000	25,600	34,100	38,000	42,250	46,750
Per acre of land irrigated (acre-feet)	8.0	10.2	9.7	8.2	8.45	8.5

[1] Estimated.

SETTLEMENT.

The total population of the project in 1913 was 1,340, about 600 living within the corporate limits of the city of Hermiston. Settlement has advanced slowly. There are 7 tracts of public land in the second unit, totaling 116 acres, open to homestead entry. One tract of Northern Pacific land, totaling 34 acres, is not covered by water-right application. There has been little or no progress in the sale of Maxwell land.

Settlement data, Umatilla project.

Item.	1912	1913	1914
1. Total number of farms on project	.....	[1] 438	[1] 440
2. Population of (1)	639	740	800
3. Number of irrigated farms	295	311	320
4. Operated by owners or managers	245	212	220
5. Operated by tenants	50	99	100
6. Population of (3)	639	740	740
7. Number of towns	1	1	1
8. Population of (7)	600	600	600
9. Total population in towns and on farms (sum of (2) and (8))	1,239	1,340	1,400
10. Number of public schools	2	2	2
11. Number of churches	4	4	4
12. Number of banks	1	1	1
13. Total capital stock	$25,000	$25,000	$25,000
14. Total amount of deposits	$100,000	$100,000	$100,000
15. Total number of depositors	600	600	600
16. Number of relinquishments	24	37	37
17. Number of cancellations	3	29	.....

[1] Number of water users.

SOIL EXAMINATIONS.

In the early fall of 1913 an examination of soil conditions was made by Messrs. Byron Hunter, Office of Farm Management; R. W. Allen, superintendent Umatilla Experiment Farm; and S. O. Jayne, Office of Experiment Stations. They reported the soils of the project to be generally coarse in texture, also deficient in nitrogen and organic matter, and expressed the opinion that "it is exceedingly doubtful if farming can be made successful on approximately half the project, namely, that part with a loose, open subsoil, where deep percolation takes place freely."

In the late spring of 1914 Mr. Charles D. Mahaffie made an examination of the project for the Oregon Conservation Commission. Mr. Mahaffie's findings were that the soil required building up, but when this was done and the soil and water were intelligently handled the results were good.

Other soil examinations have been made by Mr. A. T. Strahorn for the Department of Agriculture, by Mr. M. M. McCool for the Oregon Agricultural College, and a general examination by Mr. J. N. Brewer for the Oregon Immigration Bureau. The results of none of these three investigations are yet available.

Experience on some of the sandy soils of the project shows that good results are obtained when the soil has been built up by plowing under alfalfa, vetch, or similar growths, or by adding stable manure, supplemented by proper methods of cultivation and irrigation. Experience has further demonstrated the importance of frequent shallow irrigation, using large heads of water.

PRINCIPAL CROPS.

During 1913 approximately 5,000 acres were irrigated and 3,000 acres cropped, the difference being mainly young orchard. The total value of crops was $84,000, as compared with $77,000 in 1912. The year was for the most part favorable for all crops, but the most

promising showing was with corn. Some damage was done to the early fruits by frosts, and young orchards were considerably damaged by grasshoppers.

The agricultural situation for 1914 is little different from the preceding year. Late frosts injured the fruit crop and the young orchards, and new seedings of alfalfa are being severely damaged by the depredations of grasshoppers and rabbits. The alfalfa yield will be a little short, but all other crops are promising.

Crop report, Umatilla project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa hay	2,024	Ton	8,010	3.96	$8.00	$64,080	31.66
Apples	11	Pound	1,800	163.60	.04	72	6.50
Apricots	6	do	4,320	720.00	.05	216	36.00
Artichokes	9	Ton	119	13.20	10.00	1,170	132.00
Clover hay	20	do	34	1.70	7.35	250	12.50
Corn, Indian	56	Bushel	1,088	19.43	.84	914	16.32
Corn fodder	76	Ton	212	2.79	3.75	795	10.45
Watermelons	13	Pound	139,000	10,692.00	.075	1,042	80.15
Fruit, small	36	do	22,141	615.00	.09	1,993	55.33
Grapes	91	do	38,820	426.60	.02	776	8.53
Garden	59					2,835	48.05
Hay, except above	42	Ton	38	.90	6.00	228	5.43
Onions	3	Bushel	436	145.30	.50	218	72.67
Pasture	496					3,297	6.65
Peaches	87	Pound	62,200	715.00	.022	1,368	15.72
Potatoes	83	Bushel	7,538	90.80	.64	4,824	58.12
Less duplicated areas	79						
Total	3,033					84,078	27.72
Irrigated, no crop:							
Nonbearing orchard	1,441						
Young alfalfa	296						
Rye	682						
Miscellaneous	240						
Less duplicated areas	698						
Total	1,961						
Total irrigated	4,994						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	10,092	311
Total irrigated area farms reported	4,994	311
Under water-right applications	4,765	306
Under rental contracts	187	4
Experiment station	42	1
Total cropped area farms reported	3,033	267

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Umatilla project, to June 30, 1914.

ASSETS.

Accounts receivable:			
Uncollected miscellaneous items		$244.22	
Construction charges due and uncollected from water-right applicants		150,149.88	
Operation and maintenance charges due and uncollected from water-right applicants		23,102.74	
Total			$173,496.84
Inventories:			
Animals		2,875.00	
Mechanical and other equipment		39,415.94	
Supplies and materials on hand in storehouses		6,878.71	
Unadjusted transfers between projects		783.46	
Total			49,953,11
Construction work in process:			
Gross expenditures for construction of project to date		1,536,767.29	
Less revenue earned during construction, as follows:			
Rentals of cottages	$3,561.25		
Rentals of grazing lands	12,418.44		
Miscellaneous revenues	10,060.00		
Loss on mess houses	[1] 418.81		
Profits on mercantile stores	7.75		
Profits on hospitals	896.66		
Adjustments—			
Depreciation on plant and equipment	4,203.30		
Profits shown on Government animals	7,279.39		
Total deductions		38,007.98	
Net expenditures for construction of project to date			1,498,759.31
Deferred operation and maintenance charges			98,927.22
Total assets			1,821,136.48

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	9,404.36	
Unpaid purchases	10,569.03	
Unpaid freight and express charges	5,233.33	
Unpaid passenger fares	88.40	
Total		25,295.12
Reserves for repayment to reclamation fund of cost of project:		
Construction charges accrued on contracts with water-right applicants	307,642.72	
Construction charges paid in advance by water-right applicants	28,460.10	
Construction charges paid and forfeited by water-right applicants	1,371.22	
Total		337,474.04

[1] Deduct.

Net investment:			
Disbursements	$1,793,817.93		
Transfers received from other projects	58,241.24		
		$1,852,059.17	
Less—			
Collections	308,552.78		
Transfers issued to other projects	85,139.07		
		393,691.85	
Total			$1,458,367.32
Total liabilities, reserves, and capital investment of the Government			1,821,136.48

Functional feature costs of Umatilla project to June 30, 1914.

Development (storage) works	$773,608.17
Distribution system	541,313.49
Drainage and flood protection system	54,839.96
Real estate	50,128.98
Miscellaneous preliminary investigations	116,876.69
Gross expenditures for construction of project to date	1,536,767.29

Operating revenues and expenses, Umatilla project, to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$38,340.39
Maintenance	35,122.81
Distribution system:	
Operation	30,150.75
Maintenance	76,682.24
Drainage and flood-protection system (maintenance)	4,131.47
Total	184,427.66

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	74,871.73
Operation and maintenance charges paid in advance by water-right applicants	6,563.38
Operation and maintenance charges paid and forfeited by water-right applicants	390.53
Rentals of irrigation water	3,597.17
Miscellaneous revenues	77.63
Deferred operation and maintenance revenue (carried to debit side of assets and liabilities statement)	98,927.22
Total	184,427.66

Estimated cost of contemplated work, Umatilla project, during fiscal year 1915.

Development (storage) works:		
West extension, Three Mile Falls diversion dam (now under construction)—		
Contract price	$31,865	
Add for cement	7,500	
Add for steel reinforcement	800	
Extra work, contingencies	1,835	
		$42,000.00

Distribution system:		
First, second, third, and fourth units—		
Pipe lines, 16-inch and 20-inch cement pipe	$8,000	
Laterals, cement lined	7,000	
West extension—		
Main canal excavation, 150,000 cubic yards, at 22 cents	33,000	
Concrete lining, 16,500 cubic yards, at $8	132,000	
Three spillways	10,000	
Fencing and seeding right of way	7,500	
Telephone line	1,500	
Laterals and turnouts	7,000	
General expense	24,000	
		$230,000.00
Real estate:		
Buildings—Office building, Hermiston	6,000	
Water-right adjudication	2,000	
		8,000.00
Operation and maintenance under public notice		31,000.00
Total		311,000.00

OREGON-CALIFORNIA, KLAMATH PROJECT.

J. G. Camp, project manager, Klamath Falls, Oreg.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Klamath, Oreg.; Siskiyou and Modoc, Cal.

Townships: 38 to 41 S., Rs. 8 to 14 E., Willamette meridian; 46 to 48 N., Rs. 1 to 8 E., Mount Diablo meridian.

Railroad: California Northeastern.

Railroad stations and estimated population, January 1, 1913: Klamath Falls, 5,000; Midland, 100; and Ady, Oreg.

WATER SUPPLY.

Source of water supply: Upper Klamath Lake and Clear Lake.

Area of drainage basin: 3,700 square miles.

Annual run-off in acre-feet, 1904 to 1913: Link River at Klamath Falls—Maximum, 2,530,000; minimum, 1,450,000; mean, 1,770,000. Lost River and Willow Creek at Clear Lake—Maximum, 255,000; minimum, 35,000; mean, 125,000. Lost River at Olene and Merrill—Maximum, 475,000; minimum, 15,000; mean, 265,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: 35,400.

Area under water-right applications and rental contracts, season of 1914: 26,488.

Length of irrigation season: From May 1 to September 30—153 days.

Average elevation of irrigable area: 4,100 feet above sea level.

Average annual rainfall on irrigable area: 9 years, 14.2 inches; 1913, 15.6 inches. Relatively wet year.

Range of temperature on irrigable area: —10° to 100° F.

Character of soil of irrigable area: Disintegrated basalt, volcanic ash, and diatomaceous earth, being largely classified as Yakima sandy loam.

Principal products: Alfalfa, hay, grain, and vegetables; stock, poultry, and dairy products.

Principal markets: Portland, Oreg.; Sacramento and San Francisco, Cal.

LANDS OPEN FOR IRRIGATION.

Dates of public notices: November 18 and December 7, 1908; August 24, 1909; June 9, 1910; June 23 and March 23, 1914.

Location of lands opened: T. 38 S., R. 9 E.; 39 S., Rs. 8 to 10 E.; 40 S., Rs. 9 to 11 E.; 41 S., Rs. 10 to 12 E., Willamette meridian, and 48 N., R. 5 E., Mount Diablo meridian.

Present statuts of irrigable lands opened: 44 acres entered subject to the reclamation act; 23 acres open to entry; 29,600 acres in private ownership.

Limit of area of farm units: 160 acres.

Duty of water, 1.8 acre-feet per acre per annum at the farm.

Buidling charge per acre of irrigable land, $30.

Annual operation and maintenance charge, 75 cents per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made in October and November, 1903.

Preliminary surveys begun in 1904.

Construction recommended by a board of engineers May 1, 1905.

Construction authorized by Secretary May 15, 1905.

Main canal completed August, 1907.

First irrigation by Reclamation Service season of 1907.

Keno Canal completed October, 1908.

South Branch Canal completed March, 1909.

Clear Lake Dam completed January, 1910.
Lost River Diversion Dam completed June, 1912.
Entire project 37 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Klamath project involves the utilization of Clear Lake and Upper Klamath Lake as storage reservoirs. The storage in Clear Lake, with the aid of the Lost River diversion works, recently completed, combined with evaporation from Tule Lake during the next few years, is expected to reclaim 35,000 acres of land now submerged under the northerly portion of Tule Lake. Of the 35,400 acres of land for which the service can now supply water approximately 28,000 acres lie in Oregon in a narrow strip extending 30 miles in a southeasterly direction from Klamath Falls to the California line, and receive water from the Upper Klamath Lake through the Main, South Branch, and Adams Canal system. Six thousand five hundred acres are in the second unit, and receive water from the North and South Poe Valley, Nuss Lake, and Griffith laterals, construction of which was completed in 1913. The Griffith lateral receives its water supply from Lost River.

In addition, about 600 acres of land fringing the northerly edge of Tule Lake unit are being cultivated under rental arrangements, and receive water from the Adams Canal. Water is also diverted from the Upper Klamath Lake on the west side of Link River near Klamath Falls through the Keno power canal, a little over a mile in length. It is the intention ultimately to utilize the surplus water in this canal to furnish power for pumping water, or other purposes. The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating water arising within the same and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law heretofore made for the purposes of the project.

Features remaining for future attention are the development of the Tule Lake unit and extensive drainage of the first and second unit lands. In the case of the former it is quite probable that several years will elapse before a sufficiently large body of land will be uncovered by evaporation to justify extensive building operations.

CONSTRUCTION DURING FISCAL YEAR.

Second unit laterals.—The earthwork contract for the second unit was completed on August 15, 1913. All structures were built by Government forces and the work was practically completed by November 1, 1913.

Griffith lateral extension.—In the spring of 1913 the Griffith lateral was extended for a distance of 5 miles, thus bringing under irrigation 565 additional acres and making the total irrigable area in the second unit approximately 6,600 acres. The excavation moved amounted to 15,000 cubic yards.

Adams Canal enlargement—The Adams Canal having been found inadequate for carrying the required quantity of water, work of enlarging it was begun in the fall of 1913 and was completed before the beginning of the 1914 irrigation season. This work was divided into small schedules, each about 4,000 feet long and averaging 4,300 cubic yards, grouped into small contracts, the total yardage moved amounting to 120,000 cubic yards. Several schedules involving rock work and wet portions of the canal were reserved for Government forces. Fourteen concrete checks, 23 bridges, and 1 concrete culvert were built as necessary adjuncts to the system.

DRAINAGE.

During the fiscal year somewhat extensive investigations of the drainage conditions of the project have been carried on. These

studies and investigations show that there has been a general rise of the water table since irrigation was begun. This has resulted in a decrease in the productiveness of the soils, especially for deep-rooted crops. In many cases lands which formerly produced good yields of alfalfa are now suitable only for the more shallow-rooted crops. The cause of this condition is due in part to excess application of water to the soils and in part to unavoidable losses from canals and laterals.

During the fiscal year one half-yard drag-line excavator was operated practically continuously on drainage work. The A and B drains, 5.6 miles in length, were constructed in the vicinity of Merrill, and intercepting drains, 1.6 miles in length, were constructed below the Adams Canal. The amount of material moved was approximately 83,000 cubic yards. In May, 1914, an aditional 1-yard drag-line excavator was put to work in deepening the main drain in the Klamath Valley.

The results of the studies and construction work carried on during the fiscal year show that a comprehensive system of drains is necessary in order to protect the lands from injury by becoming waterlogged. It has been found also that drains to be effective must be relatively deep in order to provide an outlet for the water which travels through the permeable material and over the more or less impervious hardpan. This hardpan underlies most of the irrigable area, frequently at shallow depths, and is irregular as to contour. It consequently forms barriers, preventing the free percolation of ground water to natural outlets.

The result so far obtained indicates that for complete protection of the lands drainage works must be supplemented by a careful use of water. On account of the shallow nature of the soil over a large portion of the project the lands are capable of retaining but a small quantity of water, and any excess applied to them quickly raises the water table to a point dangerous to successful crop production. Surface waste flowing from higher to lower areas is also a serious detriment to many of the lands of the project. Plans for a comprehensive system of main outlets for drainage of the lands of the project have been made, and detailed plans for lateral systems to connect with these main outlets are now under way. Negotiations have been entered into with the settlers through the Water Users' Association for the providing of funds for this work. As a rule the farmers whose lands are suffering on account of excess water in them are in favor of drainage, others whose lands have not yet been seriously affected are not favorable to the project, as a whole, assuming the obligations of payment for drainage work.

OPERATION AND MAINTENANCE.

Precipitation in 1913 was above the average, rain falling during each month of the year. The total diversion of irrigation water from the Upper Klamath Lake amounted to only 38,000 acre-feet, as compared with 42,000 for the previous year.

The average water duty for the season was 2 acre-feet per acre at the head gate, with 42 per cent seepage losses in the canal and lateral systems. The Keno Canal was operated as usual. Storage in Clear Lake on June 30, 1914, amounted to 348,000 acre-feet, an increase of 96,800 acre-feet over the preceding year.

Maintenance work comprised the usual strengthening and raising of lateral banks, together with the installation of vitrified and corrugated pipe when found to be needed. Several wooden structures on the lateral system of the first unit were replaced with concrete. About 1,500 linear feet of the lined section of the South Branch Canal were repaired.

Historical review, Klamath project.

Item.	1909	1910	1911	1912	1913	1914
Acreage for which service was prepared to supply water	30,932	30,400	30,106	30,093	29,700	35,400
Area irrigated	21,000	[1] 27,108	23,869	23,834	18,928	.....
Number of farms irrigated	243	354	384	405	325	.....
Miles of canals operated	123	132	132	132	132	178
Water diverted (acre-feet)	42,097	42,000	45,600	42,100	38,000	.....
Water delivered to land (acre-feet)	24,000	23,703	29,449	23,619	22,160	.....
Per acre of land irrigated (acre-feet)	1.30	.88	1.23	1.13	1.17	.....

[1] The 27,108 acres reported includes all lands for which water-right applications had been made. Much of this, however, was not irrigated.

SETTLEMENT.

Little change has taken place in settlement conditions on the project during the past year and the population on the farms has remained practically as it was in 1913. Two nationalities, Russian and Japanese, are now represented on the project lands, each by possibly a dozen men. Meetings have been held from time to time at various points on the project and desultory attempts made to perfect cooperative organizations for the marketing of crops and the handling of cream products.

Settlement data, Klamath project.

Item.	1912	1913	1914
1. Total number of farms on project	430	350	373
2. Population of (1)	1,100	1,125	1,375
3. Number of irrigated farms	405	325	333
4. Operated by owners or managers	365	259	250
5. Operated by tenants	40	66	83
6. Population of (3)	1,028	1,050	1,300
7. Number of towns	4	4	4
8. Population of (7)	5,290	5,300	4,500
9. Total population in towns and on farms (sum of (2) and (8))	6,395	6,425	5,875
10. Number of public schools	16	16	18
11. Number of churches	9	9	9
12. Number of banks	4	3	3
13. Total capital stock	$275,000	$175,000	$175,000
14. Total amount of deposits	[1]	[1]	$1,000,000
15. Total number of depositors	[1]	[1]	2,600

[1] Figures not at hand; substantially as in 1914.

PRINCIPAL CROPS.

The principal crops on the project are alfalfa, barley, wheat, oats, potatoes. Of these alfalfa alone showed an increase in production in 1913 over 1912, amounting to 12 per cent. The production of barley decreased 26 per cent; wheat, 62 per cent; oats, 29 per cent; and potatoes, 55 per cent. Greatly increased areas have been seeded to wheat and oats in 1914, whereas the acreage in barley, alfalfa, and potatoes is less. It is difficult now to predict the season's yield, as a heavy frost occurred late in June and did considerable damage, especially in certain localities, to the growing crops, particularly the grain and potatoes.

The following table shows the crop results under irrigation from the Government system during 1913. In comparison with this is the second table, showing similar figures for crops grown without irrigation on lands within the irrigable area of the project:

Crop report, irrigated lands, Klamath project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yield.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	8,399	Ton	18,465	2.2	$8.00	$147,720	$17.63
Hay, grain	1,600	Ton	2,347	1.5	8.00	18,776	11.73
Hay, timothy	350	Ton	674	1.9	10.00	6,740	19.26
Barley	3,972	Bushel	115,074	29	.50	57,537	14.52
Wheat	583	Bushel	9,225	15.8	.75	6,919	11.80
Oats	1,601	Bushel	59,589	37.2	.30	17,877	11.16
Rye	8	Bushel	120	15	.50	60	7.50
Potatoes	212	Bushel	20,863	98.4	.50	10,432	49.20
Garden	87					5,200	60.00
Pasture	2,116					16,928	8.00
Total irrigated and cropped	18,928					288,189	15.22

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	22,580	283
Total irrigated area farms reported	18,928	283
Under water-right applications and vested rights	18,677	280
Under rental contracts	251	3
Total cropped area farms reported	18,928	283

Crop report, unirrigated lands, Klamath project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	227	Ton	538	2.4	$8.00	$4,304	$19.00
Grain, hay	621	Ton	766	1.2	8.00	6,128	9.85
Barley	1,146	Bushel	28,628	25	.50	14,314	12.50
Wheat	283	Bushel	4,155	14.7	.75	3,116	11.00
Oats	671	Bushel	19,553	19.1	.30	5,866	8.75
Rye	21	Bushel	322	15.3	.50	161	7.65
Potatoes	198	Bushel	19,254	97.2	.50	9,627	48.62
Garden	7					400	57.14
Pasture	2,070				3.00	6,210	3.00
Total cropped	5,244					50,126	9.55

PUBLIC NOTICE DATED MARCH 23, 1914.

Whereas under the provisions of the public notices and orders heretofore issued in pursuance of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, the charges for building, operation, and maintenance against private lands under the Klamath project, Oregon-California, have accrued and accumulated to such an extent that a considerable proportion of such lands thereunder are not being reclaimed and cultivated; and

Whereas it is desirable that the said lands shall be cultivated and reclaimed at the earliest practicable date:

Now, therefore, in pursuance of the provisions of the reclamation law, and in particular of the act of Congress approved February 13, 1911 (36 Stat., 902), public notice is hereby issued as follows:

1. All water-right applications filed in the year 1914 for private lands under the Klamath project shall be accompanied by the portions of installments for operation and maintenance which have accrued against the said lands, and the first full installment on account of the charges for building and maintenance, $3.75 per irrigable acre, shall be due on May 1, 1914. The subsequent installments of the charges for building and the appropriate charge for operation and maintenance shall be due on May 1 of each succeeding year until fully paid.

2. Nothing herein contained shall prevent the acceptance by any water user under the Klamath project of the benefits of any legislation now pending before Congress and which may be hereafter enacted into law affecting payments to be made on account of the water-right charges.

ANDRIEUS A. JONES,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets, liabalities, reserves, and capital, Klamath project, to June 30, 1914.

ASSETS.

Accounts receivable:			
Uncollected water rentals		$315.75	
Construction charges due and uncollected from water-right applicants		129,513.00	
Operation and maintenance charges due and uncollected from water-right applicants		4,247.35	
Total			$134,076.10
Inventories:			
Animals		2,604.85	
Mechanical and other equipment		33,728.18	
Material and supplies on hand in storehouses		8,159.63	
Unadjusted transfers between projects		793.53	
Undistributed cost (freight and handling on inventory property)		564.87	
Total			44,721.32
Construction work in process:			
Gross expenditures for construction of project to date		2,431,090.03	
Less revenues earned during construction, as follows:			
Rentals of grazing lands	$1,928.50		
Rentals of irrigation water	27,548.51		
Miscellaneous revenues	811.22		
Loss on mess houses	[1] 981.27		
Profits on mercantile stores	808.18		
Profits on hospitals	523.30		
Contractors' freight refund	8,555.71		
Adjustments—			
Depreciation on plant and equipment	775.03		
Loss shown on Government animals	[1] 692.61		
Total deductions		39,276.57	
Net expenditures for construction of project to date			2,391,813.46
Deferred operation and maintenance charges			39,107.40
Total assets			2,609,718.28

[1] Deduct.

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$2,240.17	
Unpaid purchases		3,070.27	
Unpaid freight and express charges		2,448.92	
Unpaid passenger fares		5.95	
Unpaid agreements to purchase real estate		122.00	
Unpaid miscellaneous		5.00	
Total			$7,892.31
Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		393,569.00	
Construction charges paid in advance by water-right applicants		2,440.00	
Construction charges paid and forfeited by water-right applicants		9.00	
Total			396,018.00
Net investments:			
Disbursements	$2,590,963.31		
Transfers received from other projects	71,109.24		
		2,662,072.55	
Less:			
Collections	424,780.09		
Transfers issued to other projects	31,484.49		
		456,264.58	
Total			2,205,807.97
Total liabilities, reserves, and capital investment of the Government			2,609,718.28

Functional feature cost of Klamath project to June 30, 1914.

Development (storage) works	$482,696.93
Carriage system	1,297,449.75
Distribution system	259,888.64
Drainage and flood-protection system	57,405.25
Power system	123,626.02
Real estate	34,423.87
Telephone lines	25,779.45
Roads and bridges	19,994.05
Miscellaneous preliminary investigations	100,925.70
Operation and maintenance during construction	25,837.10
Cost ledger inventories	3,063.27
Gross expenditures for construction of project to date	2,431,090.03

Operating revenues and expenses, Klamath project, to June 30, 1914.

EXPENSES.

Carriage system:		
Operation		$2,430.03
Maintenance		3,348.45
Distribution system:		
Operation		14,806.45
Maintenance		58,715.42
Drainage and flood-protection system: Maintenance		17,012.99
Undistributed expenses:		
Operation		30,535.15
Maintenance		34,365.58
Total		161,214.10

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$119,399.25
Operation and maintenance charges paid in advance by water-right applicants	476.65
Operation and maintenance charges paid and forfeited by water-right applicants	3.75
Rentals of irrigation water	2,226.75
Miscellaneous revenues	.30
Deferred operation and maintenance revenues (carried to debit side of assets and liabilities statement)	39,107.40
Total	161,214.10

Estimated cost of contemplated work, Klamath project, for fiscal year 1915.

Development (storage works):		
Upper Klamath Reservoir, surveys	$5,000	
Horsefly Reservoir, survey and roads	21,000	
Miller Creek Dam	6,330	
		$32,330
Carriage system:		
South Branch Canal	2,500	
Griffith Canal	105,051	
Adams Canal	75	
Horsefly Main Canal, surveys, etc	15,000	
Pine Grove feed canal	1,200	
		123,826
Distribution system:		
Griffith lateral	338	
Sand Hollow laterals, surveys, etc	5,000	
Tule Lake laterals, excavation, etc	2,000	
Pine Grove laterals	3,800	
Horsefly laterals, surveys, etc	18,670	
Second unit laterals	5,000	
		34,808
Drainage and flood protection: Drains under first unit excavation		122,577
Real estate and buildings:		
Rights of way	4,186	
Horsefly Reservoir site	36,000	
Buildings	3,200	
Experimental farm and equipment	4,532	
		47,918
Telephone system:		
First unit, 4 miles	1,025	
Horsefly unit, 25 miles	6,375	
		7,400
Miscellaneous preliminary investigations:		
Stream gauging	1,488	
Investigation, Horsefly district	750	
Modoc unit surveys	5,000	
Tule Lake unit, surveys, and test borings	8,000	
		15,238
Operation and maintenance during construction:		
Development	2,867	
Carriage	379	
Distribution	7,705	
General expense	4,371	
		15,322
Operation and maintenance under public notice:		
Carriage	1,602	
Distribution	22,771	
Drainage and flood protection	700	
General expense	5,239	
		30,312
Total		429,731

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

F. C. MAGRUDER, project manager, Newell, S. Dak.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Butte and Meade.

Townships: 6 to 10 N., Rs. 3 to 8 E., Black Hills meridian.

Railroads: Chicago & North Western; Chicago, Burlington & Quincy; Chicago, Milwaukee & St. Paul.

Railroad stations and estimated population January 1, 1914: Belle Fourche, 1,400; Newell, 300; Nisland, 150; Fruitdale, 100; Sturgis, 1,700; and Whitewood, 400.

WATER SUPPLY.

Source of water supply: Belle Fourche River.

Area of drainage basin: 4,265 square miles.

Annual run-off in acre-feet of Belle Fourche River at diversion dam (4,265 square miles), 1903 to 1913: Maximum, 477,150; minimum, 129,000; mean, 305,390.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: 68,852 acres.

Area under water-right applications, season of 1914: 49,130 acres.

Length of irrigation season: May 1 to October 1—152 days.

Average elevation of irrigable area: 2,800 feet above sea level.

Average annual rainfall on irrigable area: 8 years, 13.65 inches; 1913, 14.02 inches. Regarded as a normal year.

Range of temperature on irrigable area: —28° to 103° F.

Character of soil of irrigable area: North side of Belle Fourche River principally heavy clay soil, with scattered areas of sandy clay loam; south side, sandy loam. All of the soils are heavy enough not to be disturbed by winds.

Principal products: Grain, alfalfa, sugar beets, potatoes, garden truck, and small fruits.

Principal markets: Omaha, Nebr.; Chicago, Ill.; and mining towns in the Black Hills.

LANDS OPENED FOR IRRIGATION.

Date of public notices, regulations, and orders relating thereto: June 21, 1907; May 29, 1908; January 18, 1909; February 19 and November 26, 1910; January 24, March 9, May 4, and December 30, 1911; February 3 and May 2, 1912; February 26, June 23, and July 21, 1913; January 19 and February 26, 1914.

Location of lands opened: T. 7 N., Rs. 5 to 7 E.; T. 8 N., Rs. 3 to 7 E.; T. 9 N., Rs. 2 to 6 E.; T. 10 N., Rs. 3 to 5 E., Black Hills meridian.

Present status of lands opened: 21,282 acres entered subject to the reclamation act; 3,804 acres open to entry; 3,771 acres of State lands; 36,995 acres in private ownership.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 2 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $30, $35, and $40.

Annual operation and maintenance charge: 60 cents per acre of irrigable land until further notice.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers April 29, 1904.
Construction authorized by Secretary May 10, 1904.
Diversion dam and inlet canal completed September, 1907.
Belle Fourche Dam completed June, 1911.
First irrigation, season of 1908.
Entire project 90.2 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Belle Fourche project provides for the diversion of water from the Belle Fourche River by means of a dam about 2 miles below Belle Fourche, S. Dak., and an inlet or supply canal about 7 miles in length into a storage reservoir controlled by the Belle Fourche Dam on Owl Creek, a tributary of the Belle Fourche River; the distribution of water from the inlet canal to a small area of land, and the distribution of water from the reservoir through two canal systems to lands on both sides of the Belle Fourche River.

The United States claims all waste, seepage, spring, and percolating waters arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan completed are the diversion dam and headworks, inlet canal, Belle Fourche storage dam, south canal; first, second and third divisions of the north canal; laterals under the south canal; and laterals under the first, second, and third divisions of the north canal. The features remaining for future construction are the last 14 miles of the north canal and approximately 125 miles of laterals, including Willow Creek and Nine Mile laterals and their branches.

CONSTRUCTION DURING FISCAL YEAR.

North Canal.—The north canal was extended 4½ miles, terminating at Dry Creek. This extension required the excavation of 115,510 cubic yards of earth, 253 cubic yards of indurated material, and 12 cubic yards of rock. The following structures on the canal were completed: One concrete combination culvert and wasteway; 2 vitrified tile culverts; 1 steel culvert; 8 steel headgates; flume across Dry Creek; and one 40-foot timber bridge. Throughout this extension the canal has an 18-foot bottom width, banks 8 feet high, with 8 feet crown width and a grade of 0.792 foot per mile.

Lateral system.—Twenty-four miles of small laterals, containing 49,336 cubic yards of earth, have been completed. The following wooden structures were constructed: 18 bridges, 94 turnouts, and 101 drops.

The above canals and laterals serve an irrigable area of 3,140 acres.

OPERATION AND MAINTENANCE.

During the season the first, second, and third units of the project were irrigated. During 1913 there were 48,470 acres covered by water-right applications, and 29 acres of land under water-rental contract. There were 32,881 acres in crop and irrigated. The season was normal, there being a fair amount of moisture in the spring to start crops, followed by fairly dry weather in June and July.

During 1914 the same area is being irrigated as in 1913, together with 360 acres in the fourth unit of the project, to which water is being delivered on a rental charge of $1.25 per acre-foot. At the close of the fiscal year 49,130 acres were covered with water-right

applications, 360 acres under water-rental contracts, and 37,960 acres in crops and irrigated. Water was stored in the Belle Fourche Reservoir during the fall of 1913 and spring of 1914, and on June 30 there were 105,800 acre-feet of water in storage. The season has been favorable, the rainfall above normal, and on June 30 the crops were in good condition.

Historical review, Belle Fourche project.

Item.	1909	1910	1911	1912	1913	To June 30, 1914
Acreage for which service was prepared to supply water	11,923	47,568	47,568	65,852	65,852	68,852
Acreage irrigated	5,613	15,410	19,786	27,897	32,881	37,960
Miles of canal operated	63	291	295	467	474	488
Water diverted (acre-feet)	13,486	65,910	79,155	166,835	124,275	66,700
Water delivered to land (acre-feet)	9,317	30,000	32,400	30,390	47,349	18,970
Per acre of land irrigated (acre-feet)	1.66	1.95	1.64	1.10	1.44	.50

DRAINAGE.

The first irrigation on the project was during the year 1908, and about 4,000 acres west of Owl Creek and north of the Belle Fourche River were irrigated, this area including the Blair and Sorensen Flats north of Nisland, S. Dak. Seepage first appeared on the Sorensen Flat in the season of 1909 and on the Blair Flat early in the season of 1910.

The irrigation system was extended to deliver water to lands south of the Belle Fourche River and to lands under the North Canal west of Indian Creek during the season of 1910. This area included the Banana Flat east of Vale and the Indian Creek Flat north and east from the reservoir dam. Seepage indications appeared that same year on some of the farms on the Banana Flat by the production of large crops with a relatively small amount of irrigation water used, and by the season of 1911 water came to the surface over a good portion of the Banana Flat. The lands under the North Canal west of Indian Creek did not show seepage to any material extent until the summer of 1912. The area has increased very rapidly and is now extending eastward across Indian Creek Flat at the rate of about one-quarter of a mile per annum.

During 1912 about 20,000 acres of additional lands were served with water under the North Canal, the land being situated east of Indian and Horse Creeks and extending into the Newell district. Up to the present time there is practically no indication of seepage on these areas.

The seepage on the project is for the most part confined to four distinct areas: (1) Banana Flats, located on the south side of the river, in a generally easterly direction from the town of Vale; (2) Sorensen Flats, located north and west of the town of Nisland; (3) Blair Flats, located about midway between Nisland and the Belle Fourche Dam; and (4) Indian Creek Flats, located under the North Canal. It is estimated that the total area injured, to such an extent that crops can no longer be profitably grown, is 1,500 acres; while

the area threatened still further increases this amount. The seeped area has practically doubled each year since irrigation started.

At the present time there are no funds available for drainage on the Belle Fourche project. At a mass meeting of water users, held at Nisland, S. Dak., May 30, 1914, the water users voted to make no additional obligations for the construction of drainage works. Those settlers, however, whose lands are damaged by seepage are favorable to drainage construction, and a number of them have expressed their willingness to pay their proportionate part of the cost.

The rate at which seepage has been spreading the past two years indicates that unless drainage work is begun at an early date considerable areas of the project will eventually become unfit for cultivation.

SETTLEMENT.

During the past year there has been only a slight increase in the number of settlers on the project. The amount of land in private ownership changing hands has been small. In spite of the fact that settlers have worked hard and spent the major portion of their earnings in improving their lands, land values have actually decreased in a good many instances.

During the year the Butte County Development Association was formed. This is an association composed of farmers from all over the county. The association has for its purpose the improvement of markets, transportation facilities, and the securing of a county agent to work with the farmers. The organization was started early in 1914, and very little has so far been accomplished.

A large proportion of the farmers under the project were miners in the Black Hills, and many of these are making good progress. There are, however, many lawyers, doctors, mechanics, and clerks who are trying to carry on farming as a side issue and who are not cultivating the soil to advantage, but are holding out of use irrigable areas which would otherwise furnish homes for actual farmers. Nevertheless, there is a solid, substantial growth and material prosperity being made and the population is gradually becoming more fixed. There is renewed confidence in the future of the project, coupled with the appreciation of the fact that the future must be wrought out by individual and collective effort.

Settlement data, Belle Fourche project.

Item.	1912	1913	1914 (estimated).
1. Total number of farms on project	1,290	1,292	1,292
2. Population of (1)	1,800	2,230	2,360
3. Number of irrigated farms	611	637	659
4. Operated by owners or managers	405	456	442
5. Operated by tenants	206	181	217
6. Population of (3)	1,352	1,575	1,650
7. Number of towns	5	5	5
8. Population of (7)	2,400	2,025	2,200
9. Total population in towns and on farms, sum of (2) and (8)	4,200	4,255	4,560
10. Number of public schools	20	23	23
11. Number of churches	11	11	11
12. Number of banks	10	10	10
13. Total capital stock	$186,000	$186,000	$201,000
14. Total amount of deposits	$1,000,000	$1,000,000	$1,095,000
15. Total number of depositors	3,000	3,100	3,361
16. Number of relinquishments	2	2	4
17. Number of cancellations	2	.....	.....

PRINCIPAL CROPS.

The total acreage in crop during 1913 was 32,881, yielding a total gross return of $355,380, or an average value per acre of $10.91. Wheat, alfalfa, oats, and corn were, in the order named, the most important crops. These four crops represented about 91 per cent of the cropped area for the season and returned about 76 per cent of the total estimated crop value. During the season of 1913 the area in wheat increased from 11,083 to 13,096 acres, that in alfalfa from 3,906 to 8,964 acres, while the acreage in oats and corn remained about the same as the previous year. At the close of the fiscal year crop conditions on the project were better than they have ever been before at this time of the year. The first cutting of alfalfa had been harvested and very good yields were had. Wheat and oats have stooled well, and the prospects are good for yields above normal for these crops.

Crop report, Belle Fourche project, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa hay	7,388	Ton	15,854	2.1	$4.50	$71,343	$9.65
Alfalfa seed	1,576	Bushel	2,157	1.4	6.00	12,942	8.21
Barley	744	do	18,101	24.3	.60	10,861	14.59
Beans	67	do	447	6.7	2.00	894	13.34
Beets, sugar	8	Ton	47	5.9	5.00	235	29.37
Corn, Indian	1,859	Bushel	35,615	19.1	.80	28,492	15.32
Corn, fodder	709	Ton	729	1.0	4.00	2,916	4.11
Flax	219	Bushel	1,027	4.7	1.50	1,540	7.03
Garden	177					3,820	21.58
Hay, native	2,533	Ton	2,232	.9	10.00	22,320	8.81
Millet seed	54	Bushel	315	5.8	1.00	315	5.83
Oats	5,343	do	161,765	30.3	.40	64,706	12.11
Pasture	285					1,990	6.98
Potatoes, common	298	Bushel	25,704	86.3	.60	15,422	51.75
Rye	71	do	768	10.8	.60	461	6.49
Wheat	13,096	do	195,205	14.9	.60	117,123	8.94
Less duplicated areas	1,859						
Total	32,568					355,380	10.91
Irrigated, no crop:							
Young alfalfa	191						
Miscellaneous	122						
Total	313						
Total irrigated	32,881						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	46,744	581
Total irrigated area farms reported	32,881	581
Under water-right applications	32,852	578
Under rental contracts	29	3
Total cropped area farms reported	32,568	581

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Belle Fourche project, to June 30, 1914.

ASSETS.

Cash in fiscal agent's possession awaiting remittance		$14.15
Accounts receivable:		
Uncollected miscellaneous rentals	$10.00	
Uncollected miscellaneous items	115.20	
Construction charges due and uncollected from water-right applicants	167,887.70	
Operation and maintenance charges due and uncollected from water-right applicants	39,418.37	
Total		207,431.27
Inventories:		
Mercantile-store stock on hand	16.94	
Animals	6,210.00	
Mechanical and other equipment	25,004.92	
Materials and supplies on hand in storehouses	19,029.87	
Total		50,261.73
Construction work in process:		
Gross expenditures for construction of project to date	3,216,381.05	
Less revenue earned during construction as follows—		
Rental of cottages	$3,013.58	
Rental of grazing lands	1,994.30	
Rental of telephones	87.03	
Miscellaneous revenues	4,190.89	
Loss on mess houses	[1] 4,794.36	
Profits on mercantile stores	1,538.25	
Profits on hospital	855.70	
Receipts from sale of town lots	51,600.63	
Contractor's freight refunds	2,535.93	
Forfeitures by defaulting bidders and contractors	7,337.50	
Adjustments—		
Depreciation on plant and equipment	667.77	
Profits shown on Government animals	6,743.72	
Total deductions	75,770.94	
Net expenditures for construction of project to date		3,140,610.11
Deferred operation and maintenance charges		104,410.52
Total assets		3,502,727.78

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	7,640.66	
Unpaid purchases	3,971.91	
Unpaid contract estimates	37,018.34	
Unpaid contract holdbacks	45,712.51	
Unpaid freight and express	5,517.68	
Unpaid passenger fares	128.20	
Unpaid miscellaneous	768.22	
Total		100,757.52

[1] Deduct.

Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		$274,201.56	
Construction charges paid in advance by water-right applicants		1,212.00	
Construction charges paid and forfeited by water-right applicants		588.00	
Total			$276,001.56
Net investment:			
Disbursements	$3,359,098.98		
Transfers received from other projects	85,330.65		
		3,444,429.63	
Less—			
Collections	281,231.33		
Transfers issued to other projects	37,229.60		
		318,460.93	
Total			3,125,968.70
Total liabilities, reserves, and capital investment of the Government			3,502,727.78

Functional feature costs of Belle Fourche project to June 30, 1914.

Development (storage) works	$1,731,962.10
Carriage system	943,014.48
Distribution system	489,167.16
Real estate	30,722.12
Telephone lines	12,775.37
Farm units and subdivisions	5,007.89
Miscellaneous preliminary investigations	3,310.30
Cost ledger inventories	421.63
Gross expenditures for construction of project to date	3,216,381.05

Operating revenues and expenses, Belle Fourche project, to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$8,275.48
Maintenance	39,275.04
Carriage system:	
Operation	12,785.89
Maintenance	41,484.64
Distribution system:	
Operation	23,434.71
Maintenance	101,334.93
Drainage and flood-protection system, maintenance	3,619.60
Undistributed expense:	
Operation	602.17
Maintenance	5,574.49
Total	236,386.95

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	130,339.45
Operation and maintenance charges paid in advance by water-right applicants	2.39
Operation and maintenance charges paid and forfeited by water-right applicants	180.40

Rentals of lands and buildings	$118.00
Rentals of irrigation water	1,319.14
Miscellaneous revenues	17.05
Deferred operation and maintenance revenues (carried to debit side of assets and liabilities statement)	104,410.52
Total	236,386.95

Estimated cost of contemplated work, Belle Fourche project, during fiscal year 1915.

Carriage system, north canal, division "D"		$38,000.00
Distribution system:		
Construction of measuring devices on laterals, divisions "A," "B," and "C"	$7,000.00	
Laterals, division "D"	65,000.00	
Total		72,000.00
Drainage investigation		2,000.00
Telephone-line extension		900.00
Survey of farm units		500.00
Operation and maintenance under public notice		60,632.50
Total		174,032.50

TEXAS, PECOS RIVER VALLEY INVESTIGATION.

In January, 1914, the Secretary of the Interior authorized an investigation of the Pecos River, following requests from the West Texas Reclamation Association of residents in the Texas valley of the river. The investigation was begun in February and completed in August by Mr. P. M. Fogg, engineer, who has submitted a report from which the following data are taken:

General description.—The Pecos River rises in northern New Mexico, and, draining 23,000 square miles in New Mexico and 9,000 in Texas, flows 650 miles in a general southerly direction to the Rio Grande. In Texas the river flows through gently sloping valleys to a point about 125 miles above its mouth. Below this point the valley narrows and there are no irrigation possibilities. The stream is fed by numerous tributaries of flashy or intermittent discharge, making the flow of the river unsteady, with short, heavy floods in summer. Underground flow and seepage water through springs in the river bed form a material part of the discharge. The New Mexico portion of the drainage is utilized for irrigation, notably in the Carlsbad project of the Reclamation Service, and in Texas there are a number of private projects in various stages of development.

Pecos Valley in Texas.—The Texas valley has a floor of limestone and gypsum, generally overlain with sand, sandy loam, and clay loam of good quality. During floods the river overflows at numerous points, usually covering a strip of land one-half to 1 mile wide on each bank. These areas are covered with heavy, dark-red silt, 5 to 8 feet thick.

The climate is favorable for irrigation, with mild winters and long, warm summers. The annual precipitation is from 9 to 15 inches. Temperature records at Barstow, Tex., show a maximum of 110° F., a minimum of 3° F., and a mean of 65° F. Killing frosts may occur as late as April 17 and as early as October 21. The annual evaporation is believed to be about 8 feet.

Transportation facilities are good. Three railroads cross the valley, reaching good markets at El Paso, Fort Worth, Dallas, Houston, and more distant points.

The chief industry of west Texas is stock raising. Irrigation has developed quite rapidly in the Pecos Valley in the past 20 years, bringing more intensive operations of increasing importance. The cost of clearing the land of mesquite and other natural growths, breaking and preparing for crops, is estimated at $16 per acre, which is offset by the value of the firewood produced. The principal crops now grown are alfalfa, alfalfa seed, and cotton, with lesser areas of milo, Kaffir, fruits, and truck. Little live stock is raised on the farms and hay is shipped out. Under favorable conditions five cuttings of alfalfa are obtained, yielding 4 tons per acre. Hay of good quality brings prices from $10 to $18 per ton, baled, at shipping points. More intensive farming would follow a more certain water supply and better methods in marketing products. The section is well adapted to truck crops. The soils require fertilization, and commercial fertilizer is commonly used.

Irrigable lands.—The valley lands in Texas comprise several hundred thousand acres accessible by gravity systems, but this area is far in excess of that for which water is available. The land is all privately owned, considerable areas by railroad companies.

The silt areas bordering the river are not well adapted to irrigation, because the heavy, tight soil is difficult to work, and its poor draining quality is accentuated by lack of slope. Otherwise the valley lands are excellent for irrigation, with natural drainage due to a porous soil and favorable slope. This does not insure that artificial drainage is unnecessary, but that it can probably be postponed and readily accomplished.

In general the soils lack nitrogen and are high in alkaline salts. The soluble alkali is a menace in case of water-logging, especially in the soils near the river, where the drainage is poor and the salt content highest.

The private projects already initiated in the valley contemplate in the sum the irrigation of a much larger area than the water supply warrants. The table gives data regarding the projects that take water from the Pecos.

Private projects in Pecos Valley, Tex.

Name.	County.	Approximate area in acres.		Year built or first operated.
		Total.	Cultivated in 1914.	
Arno	Reeves	15,000	100	1894
Porterville pumping	Loving	6,000	600	1910
Farmers' Independent	Reeves	10,000	2,100	1909
Biggs	Ward	12,000	1,400	1907
Barstow	Ward, Reeves	27,000	7,500	1892
Big Valley	Ward	16,000	160	1908
Grandfalls	Ward, Crane	32,000	7,000	1890
Imperial	Pecos	25,000	7,500	1911
Zimmerman	do	26,000	1,700	1910
Victor pumping	Crane	4,000	.....	1914
Total	.....	173,000	28,060	

Duty of water.—Sufficient data are not available through measurements in the Texas Valley to determine the duty of water. The conditions are similar to those on the Carlsbad and Rio Grande projects, except for the very porous soil, which will cause a lower duty. Three and one-half acre-feet per acre, measured at the land, is considered reasonable. With canal losses of only 30 per cent, the diversion duty would then be 5 acre-feet. Considerable further losses will occur by seepage and evaporation from storage reservoirs and in conveying the water to the various diversions strung out along the river. This will probably raise the requirement to 8 acre-feet of available annual run-off per acre irrigated.

Water supply.—The recorded discharge data for the Pecos are not sufficiently complete to determine accurately the available water supply, but a study of the collected data indicates an average annual run-off at Pecos from 1900 to 1906 of approximately 320,300 acre-feet, excluding the abnormal years of 1904 and 1905. Allowance must be made from this for the development of the Carlsbad project. In the years named about one-fourth of the Carlsbad area was culti-

vated. The average present requirement at Carlsbad is about 9 acre-feet per acre in the river. On this basis, if the entire tract had been cultivated in 1900 to 1906, it would have withdrawn 167,400 acre-feet, reducing the run-off available for the Texas Valley to 152,900 acre-feet. It may be assumed that about 80,000 acre-feet would have been returned to the river by springs and by seepage from the Carlsbad project, bringing the available run-off up to about 233,000 acre-feet. Under the assumed requirement of 8 acre-feet per acre this would supply about 30,000 acres.

Since 1907 measurements have not been made at Pecos, but have been taken at Moorhead, about 5 miles above the mouth of the river. For years of simultaneous measurement at these two points the figures indicate that the discharge at Pecos is about 72 per cent of that at Moorhead. Applying this factor to the measurements at Moorhead since 1907 and making a similar allowance for Carlsbad to that above indicates an annual water supply of about 266,300 acre-feet, or sufficient for 33,000 acres. To this may be added 15,000 acres as about the average area irrigated in the Texas Valley from 1907 to 1914.

These figures indicate a water supply sufficient for 30,000 to 50,000 acres in the Texas Valley, including the areas now watered. This provides for the complete development of the Carlsbad project, but other future development in New Mexico may lessen the supply and more accurate information as to the return waters may indicate a further decrease, or possibly some increase.

The situation is complicated by conflicting claims and the uncertain status of water rights, which has caused much litigation. The location of Texas on the border between the arid and humid regions has led to a clash of the doctrines of riparian right and right of prior appropriation. The State statutes and court decisions lack clear-cut precedents and do not provide a definite course of action.

The quality of the water supply is of importance. At low stages of the river the water is quite alkaline, due to solution of the underlying strata by the river water and return seepage. Analyses show an increasing salt content at each point further downstream. Carbonate of lime, sulphates of lime and magnesium, and chloride of sodium are the principal salts carried.

Water storage.—The foregoing figures are sufficiently accurate to show conclusively that the water supply is insufficient for the irrigable lands and any comprehensive scheme must utilize the entire water supply. Storage is therefore a prime requisite. A number of reservoirs have been developed or proposed. The principal data regarding these are shown in the table. All except the Red Bluff site are inland basins, requiring feed canals and liable to large losses through seepage and evaporation. The tightness of the floors is questionable on account of the general occurrence of gypsum. These basins are, moreover, not available for the valley as a whole, but would serve separate projects, and the construction of all or a number of them would multiply water losses.

The Red Bluff site would conserve all the available water above the site, serve all areas that may be developed, and save water losses through the absence of any feed canal and the concentration of the stored water in one relatively deep body. The Red Bluff site is therefore worthy of further investigation to determine its feasibility. The dam site is below the mouth of Delaware Creek, in New Mexico.

The reservoir is excellent topographically, being 11 miles long and averaging 1½ miles wide, with steep valley sides. The dam site shows limestone at the west abutment; no rock is visible at the east abutment, but soundings are reported to indicate its presence a little below the gravel river bed. Materials are available near by for either an earth and rock fill structure or one of concrete with earthen dikes. Suitable allowance must be made for considerable silt deposits.

Reservoir sites for Pecos Valley in Texas.

Project.	Site.	Near.	Dam or embankments.		Flow-line area.	Capacity.	Required length of feeder canal.
			Maximum height.	Crest length.			
			Feet.	*Feet.*	*Acres.*	*Acre-feet.*	*Miles*
Inland basins constructed:							
Imperial	Imperial	Grandfalls	20	7,500	1,580	17,000	17
Zimmerman	Zimmerman	do	12	6,600	700	2,000	2
Inland basins proposed:							
Arno	Riverton	Riverton	25			2,100	
Barstow	Sand Lake	Pecos	13	8,600	3,900	48,000	30
Big Valley	Ward Lake	Barstow	57	21,000	7,720	152,300	8
	Toyah Lake	Pecos	20	3,960	6,300	54,000	10
Grandfalls	Lepp Lake	Grandfalls	32	13,441	2,360	37,000	16
Do	Shook Lake	do	40	8,900	1,000	17,000	15
Reservoir in river channel:							
All	Red Bluff	Delaware Creek	85	3,629	11,600	190,000	

In addition to the Red Bluff site, that at Toyah Lake can probably be developed to advantage to conserve the tributary run-off that passes through the lake and enters the river below the Red Bluff site.

Conclusions.—The Texas Valley of the Pecos contains irrigable land of good quality in excess of that for which water is available.

With full utilization the water supply will probably serve not over 50,000 acres, including the present developments. Future developments in New Mexico may lessen the supply.

To secure the irrigation of the largest area cooperation of all the present and proposed projects is necessary for economical storage and the settlement of water rights.

The present projects, if fully developed, can not all be served. Either the best part of each can be watered or some projects will be developed to the exclusion of others.

Water storage is imperative. The most attractive site is Red Bluff Reservoir, which warrants investigation of underground conditions. Toyah Lake can be used to advantage to save the run-off of a small drainage area.

Economy in the use of water should be encouraged. Water should be measured to users and charges based on the amount used.

Careful stream measurements should be continued in Texas to determine more accurately the available water supply.

FINANCIAL STATEMENTS.

The assets and liabilities are shown in the financial statement for the secondary projects. The costs are given in the functional feature cost report, which follows the above statement, and the net investment is given in Tables 11 and 12 in the appendix.

UTAH, STRAWBERRY VALLEY PROJECT.

J. L. Lytel, project manager.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Utah and Wasatch.

Townships: 8 and 9 south, Rs. 1 to 3 E., Salt Lake base and meridian.

Railroads: Denver & Rio Grande; San Pedro, Los Angeles & Salt Lake.

Railroad stations and estimated population January 1, 1914: Spanish Fork, 3,600; Payson, 2,800; Springville, 3,600.

WATER SUPPLY.

Source of water supply: Strawberry and Spanish Fork Rivers and a number of small streams and springs not on the watersheds of these two. Contemplated pumping plants.

Area of drainage basins: Strawberry River, including Indian and Trail Hollow Creeks, 175 square miles; Spanish Fork River, 670 square miles.

Annual run-off in acre-feet: Strawberry River in Strawberry Valley, including Indian and Trail Hollow Creeks, 1903–1906 and 1909–1913; maximum, 150,000; minimum, 49,000; mean, 75,000. Spanish Fork River at Spanish Fork, 1903–1913: Maximum, 227,000; minimum, 65,000; mean, 113,650.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water during the season of 1914, none; 135,000 acre-feet available in reservoir.

Length of irrigating season: April 15 to September 30—169 days.

Average elevation of irrigable area: 4,600 feet above sea level.

Average annual rainfall: 18 inches; at Payson (6 years), 20.14 inches; at Provo (18 years), 14 inches; 1913, 18.81 inches.

Range of temperature on irrigable area: —10° to 95° F.; mean temperature at Provo, 49.3° F.

Character of soil of irrigable area: Sandy loam, heavy clay, and varying mixture of both; black alluvium; loam and gravel. Bench land: Loam and gravel. Much of the soil is underlaid by a coarse gravel, and the natural drainage is excellent.

Principal products: Alfalfa, hay, cereals, sugar beets, fruits, and vegetables.

Principal markets: Salt Lake City, Utah, and adjacent towns and mining districts.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers October 2, 1905.

Construction authorized by Secretary December 15, 1905.

Excavation of tunnel completed June 20, 1912.

Storing of water in Strawberry Reservoir begun July 14, 1912.

Construction of Indian Creek Dike completed September, 1912.

Strawberry Tunnel formally opened by allowing reservoir water through September 13, 1913.

Construction of Strawberry Dam completed September 20, 1913.

Entire project, 70 per cent completed June 30, 1914.

IRRIGATION PLAN.

The irrigation plan of the Strawberry Valley project provides for the storage of water in a reservoir on Strawberry River; the discharge of the stored water through Strawberry Tunnel, approximately 3¾ miles long, into Diamond Fork, a tributary of Spanish Fork River, and the diversion of water from Spanish Fork River into canal systems, watering lands east and south of Utah Lake. A hydroelectric plant on the south side of the river 3¾ miles below the diversion dam supplies power for construction and commercial purposes. Part of the power developed will ultimately be used for pumping water for irrigation of high lands and drainage of low lands. The United States claims all waste, seepage, unappropriated spring and percolating water arising within the project, and proposes to use such water in connection therewith.

The completed features of the irrigation plan are: Diversion dam on Spanish Fork River; power canal; the first unit of the hydroelectric power plant on Spanish Fork River; Strawberry Tunnel, through the rim of the Great Basin, and the following features in connection with the Strawberry Reservoir: Strawberry Dam; Indian Creek Dike; Indian Creek and Trail Hollow diversion canals and appurtenant structures; east portal permanent camp. In connection with the construction of these features, 43.5 miles of wagon road, 44 miles of telephone lines, and 49.5 miles of high tension power transmission lines have been built. Power from the United States Reclamation Service power house is being supplied to Payson, Salem, and Spanish Fork for lighting and other purposes, the Reclamation Service having built the high-tension lines from its power house to these towns. The towns built their own substations and distribution lines.

In accordance with present plans the features remaining to be constructed on the project are the High Line Canal with distribution system, together with the Mapleton lateral and such other structures as it may be decided to build in connection with the disposal of water to the present existing canals.

CONSTRUCTION DURING FISCAL YEAR.

Strawberry Dam.—This feature was completed on September 20, 1913. The work done consisted of riprap on the downstream side of the dam up to elevation 7,549.5; finishing the excavation of the wasteway; and building a reinforced concrete bridge across the wasteway at the crest of the spillway weir. The camp buildings were sold; the crushing and mixing plant dismantled; the cableway taken down and all equipment hauled to Diamond Switch for transfer. On June 30, 1914, the elevation of the water in Strawberry Reservoir was 7,541.5, approximately 135,000 acre-feet of water being available for use.

Indian Creek and Trail Hollow Diversion Canal.—This feature was completed early in September, 1913. The work done consisted chiefly of finishing by Government forces canal excavation not done by the contractor. Indian Creek Diversion Dam was strengthened by the addition of 600 cubic yards and 975 cubic yards of material excavated from three large drain ditches. A small ditch was dug in the bottom of Trail Hollow Canal to provide for the small winter flow and keep the canal open during the cold weather.

East Portal Permanent Camp.—This feature was completed on October 7, 1913. The work done consisted mainly of building two cement plaster houses for gate operators and a reinforced concrete building over the controlling works shaft to protect the hoisting mechanisms in connection with the tunnel gates for the control of reservoir water through Strawberry Tunnel. Most of the camp buildings were sold, although some were moved back for use as stables and storehouses. All equipment was hauled to Diamond Switch for transfer, and the grounds were cleaned up and houses

made ready for occupancy of the men who were to guard and maintain the Government structures during the winter.

Strawberry Tunnel.—On September 13 the gates at East Portal were raised and water was allowed to pass through the tunnel. Approximately 950 cubic yards of material were washed from the tunnel into the stilling basin. The tunnel water developed during construction still continues to flow, the quantity discharged ranging from 7 to 9 second-feet.

Power plant, power canal, and transmission lines.—The power plant was operated continuously throughout the year, except for a few weeks in October and November, when it was operated only one-half the time on account of cleaning the canal. Power was furnished by contract to Payson, Salem, and Spanish Fork throughout the fiscal year. The water wheels and governors of the two units were thoroughly overhauled and the cast-iron runners and wicket gates replaced with cast steel.

The power canal was cleaned of silt and débris from October 7 to November 17. Material was removed during the day and water turned in at night. The high-tension power-transmission lines were operated continuously throughout the year. Service over the line to the tunnel was discontinued in September, 1913, and the line razed from Strawberry Dam to the top of the divide, and from Diamond Switch to milepost 10, on the Government road, a distance of 16 miles,

SURVEYS AND INVESTIGATIONS.

Topographic survey was made of Sixth Water and Diamond Fork Canyon to Three Forks to determine possible sites for the development of power from reservoir water.

Hydrographic work was carried on to secure a record of the flow of all the streams in any way connected with the supply of the project. Thirty-two gauging stations were maintained and approximately 524 meter measurements made.

The preliminary location of the Mapleton lateral for a distance of about 6 miles was completed, and the preliminary designs for the structures on both the Mapleton lateral and High Line Canal are well along.

Considerable work was necessary in connection with the signing of water-right applications on the Highline unit. Approximately 100 surveys and examinations of land were made and a great deal of miscellaneous work done in connection with land descriptions.

SEEPAGE AND DRAINAGE.

No further investigations of seeped land were made, as the landowners decided that they did not care to have anything done in regard to drainage at present, but would rather leave the matter until a later date, and do the work under the State drainage district law.

WATER USERS' ASSOCIATION.

On August 22, 23, and 25, 1913, a conference was held between the Reclamation Service officials and the members of the board of directors of the Strawberry Valley Water Users' Association. At

this meeting a proposition was submitted to them for consideration, called the "segregated-area scheme." No results, however, were accomplished at this meeting toward any definite settlement. Accordingly, on October 20, the Secretary of the Interior sent the association the following communication, giving it 60 days to approve one of the two propositions set forth in his letter:

There has been presented to me the proposition which you submitted to the representative of the Reclamation Service August 25, regarding the adjustment of water rights on Spanish Fork in connection with the Strawberry Valley project.

The proposition to take an average of 4 to 10 years as a basis of water delivery to be made by the United States to the old canals is regarded as requiring too large a draft upon the storage in Strawberry Reservoir without corresponding benefit to the United States.

The Reclamation Service has worked out a basis for the assumed flow of the river day by day which takes into consideration the proper balance between the average year and the low years, which, for convenience, may be called the typical year or typical river. No charge will be made for the delivery of such water supply at the heads of the several canals.

The typical year will provide for a certain amount of storage to maintain the proper deliveries to the old canals which is regarded as a fair and reasonable offset for a part of the flood waters in the spring, which would thus be made available for the remainder of the project.

As to the other lands under the old canals, it is estimated that there will be a full water supply of 2 acre-feet per acre per annum during the irrigation season for 18,000 acres, for which shall be paid the price per acre fixed for the entire project—namely, $80 per acre—with a credit on account of the distribution system now available amounting to $20, leaving the charge per acre $60.

If the adjustment can be made upon the foregoing basis, the Highline Canal will thereupon be built for furnishing a full water supply of 2 acre-feet per annum for 24,000 acres at $80 per acre. These figures are in each case in addition to a proper charge for operation, maintenance, and betterments.

Under this arrangement the water supply will be delivered at the head gates of the several old canals and is to be distributed to the holders of the old water rights and to the holders of the new water rights under the reclamation act as above provided. The necessary enlargements of the old canals and the extension of the distributing system shall be provided for by the canal companies and the water users thereunder at their own expense.

The old canals shall be operated by the present canal companies as canal divisions under the Water Users' Association with the right reserved to the United States to perform the necessary work of enlargement and extension of laterals if not properly performed by the canal companies, and the right shall also be reserved to the United States to enter upon the properties of the canal companies and the water users to secure a proper disposition of the water supply to the several persons entitled thereto in case of failure to secure such distribution on the part of the canal companies or the Water Users' Association. In either such case the United States shall be reimbursed for any expense incurred.

The charge for water right on the project and the credit to be given for new water rights under the old canals shall be incorporated in a form of water-right application, together with the other necessary conditions, and shall be presented to the water users for execution and depositing with a trustee who shall be required to record the same upon designation by the Secretary, which shall be given when 75 per cent of the shareholders under each of the old canals shall have signed an appropriate contract agreeing to adopt the typical river as a basis of their water rights and when the owners of 14,000 acres under the old canal system have executed water-right applications for a full water right as above.

At the same time that these contracts and applications are being executed, the landowners under the Highline Canal will be required to execute appropriate water-right applications to be placed in the hands of the trustee for recording upon designation of the Secretary of the Interior, which shall be made when applications for 16,000 acres of the lands in private ownership under the Highline shall have been so executed.

The water for the lands under the Highline Canal shall be delivered at the head of the Highline Canal and shall be distributed by the landowners thereunder, reserving the right to the United States to secure proper deliveries to each individual water-right applicant at the expense of the Highline Canal water users in case of failure to provide for proper distribution.

As an alternative the landowners under the old canals may execute appropriate subscriptions to the stock of the water users' association and also water-right applications, both to be placed in the hands of a trustee, for an acreage of 13,000 acres, for which there is now claimed a complete water right from the unregulated flow of Spanish Fork, to be supplemented by such an amount as to make 2 acre-feet per acre during the irrigation season, with full rights in the project on the basis of a credit of $65 per acre from the general charge for the project of $80 per acre.

In addition 23,000 acres under the old canals may be entitled to a full water right of 2 acre-feet per acre per annum during the irrigation season at a credit of $20 per acre from the general charge for the project of $80 per acre.

In order to make this alternative effective it will be necessary that appropriate water-right applications and contracts shall be executed representing an area of not less than 10,000 acres of the said 13,000 acres, to be placed in the hands of a trustee, and that appropriate water-right applications for not less than 18,000 acres of the said 23,000 acres shall be executed and placed in the hands of a trustee, whereupon the contracts and water-right applications shall be recorded upon the designation of the Secretary of the Interior.

At the same time water-right applications on appropriate forms will be presented to landowners under an extension of the Highline Canal west of West Mountain for execution on their part and placed in the hands of the trustee.

If the landowners under the old canals do not comply with one of the above alternatives within 60 days after contracts and water-right applications have been presented to the Water Users' Association, and if at the same time the necessary water-right applications for lands under the Highline Canal and the extension shall have been executed, the engineers in charge of the project are hereby directed to begin the construction of the Highline and the Highline extension, leaving the adjustment of the respective water rights as between the canal companies and the United States to such further action as may be necessary.

It is to be understood that no one of the above propositions will require the Reclamation service to perform any construction which may hereafter become necessary to provide for drainage of seeped or water-logged lands.

It is also understood that, if desired, the owners of lands under the old canals and landowners under the Highline may have separate water users' associations or that they may preferably organize irrigation districts as authorized by State laws.

It is also understood that no stored water will be furnished to any lands under the old canals unless appropriate contracts and water-right applications have been executed as above required.

The payments of the building charge shall be graduated substantially as follows: $1, $2, $3, $4, $5 for the first five years, and thereafter $5 for the next four years, and the balance in the tenth year, subject to any extension made applicable by future statutes.

The present Water Users' Association is expected to make an immediate canvass to secure the views of the owners of the several classes of lands under the old canals and to advise me in Washington within 20 days from date as to the number of persons who will informally agree to one of the plans suggested, and the number favoring each plan.

If the canvass does not show a majority of the stockholders of the canal companies, representing a majority of the acreage involved, in favor of one of the alternative plans suggested, it will be necessary that the entire water supply available for the project be devoted to the lands under the Highline and its extension or other modification of this plan as may be deemed advisable by the department.

It is my sincere desire that there may be such an adjustment that the lands under the old canals may be included in the project.

On October 31 the association met and decided to separate into two associations, one covering landowners under the five Spanish Fork canals, the other the dry-land owners under the Highline Canal. No action was taken in regard to the Secretary's letter

of October 20, but on December 19 the association forwarded a communication to the Secretary of the Interior refusing to accept either proposition.

On January 20, 1914, petitions were received from the Mapleton and Lake Shore districts, asking that they be furnished water from the Strawberry Reservoir, the total area requesting water being approximately 5,000 acres. On March 9 a petition was received from landowners near Nephi, requesting that a portion of the waters of the Strawberry Valley project be diverted into Juab County for their use, the total area requesting water being approximately 20,000 acres. On March 25 the Secretary, through a letter to the project manager, abrogated the contract between the water users' association and the United States, entered into March 5, 1906. On March 31 a petition was received from Clinton district, asking that they be furnished with water from the Strawberry Valley project.

HIGHLINE UNIT.

In accordance with a petition received on September 2, 1913, from the landowners under the Highline unit, the Secretary of the Interior approved a form of water-right application on February 24, 1914, under which the land under the Highline unit would be signed up for water. On May 8, 1914, the preliminary conditions under which land under the Highline Canal would be signed up and under which construction work would be begun were approved by the Secretary. At mass meetings held at Payson and Santaquin on May 18 and 21 water-right applications and conditions were presented to the landowners and accepted, and the work of signing water-right applications begun. On June 30 water-right applications for approximately 16,500 acres had been signed up and preliminary work on the examination of these applications begun by the engineering and legal departments.

MAPLETON UNIT.

In accordance with a petition signed by 208 landowners in the vicinity of Mapleton, the water-right applications and conditions under which the Mapleton lateral was to be built were approved by the Secretary and submitted to the landowners at a mass meeting held at Mapleton June 3. At this meeting the landowners appointed a committee to further investigate the proposition, but at the close of the fiscal year no further action had been taken in the matter.

OLD CANAL SYSTEM.

A number of committees from the Lake Shore Irrigation Co., Salem Canal Co., and Spanish Fork South Irrigation Co. have called at the office for the purpose of discussing the possibility of land under their respective canals securing water. Nothing final has resulted from these meetings, but it is likely that some definite understanding will be arrived at in a short time under which water can be sold to these canal companies or lands under them.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Strawberry Valley project, to June 30, 1914.

ASSETS.

Cash in fiscal agent's possession awaiting remittance			$6.90
Accounts receivable, uncollected miscellaneous items			1,080.00
Inventories:			
Animals		$2,605.00	
Mechanical and other equipment		40,820.32	
Material and supplies on hand in storehouses		16,176.93	
Unadjusted transfers between projects		[1] 53.54	
Undistributed cost (freight and handling on inventory property)		3,494.55	
			63,043.26
Construction work in process:			
Gross expenditures for construction of project to date		2,390,424.90	
Less revenue earned during construction, as follows:			
Rentals of cottages	$5,144.30		
Rentals of grazing lands	54,168.85		
Rentals of power and light	20,677.55		
Rentals of irrigation water	250.00		
Rentals of telephone	1,211.76		
Profits on mess house	5,190.64		
Profits on mercantile stores	9,146.59		
Loss on hospital	[1] 2,810.78		
Adjustments—			
Depreciation on plant and equipment	[1] 3,003.85		
Loss shown on Government animals	[1] 2,935.48		
Total deductions		87,039.58	
Net expenditures for construction of project to date			2,303,385.32
Total assets			2,367,515.48

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		2,522.63	
Unpaid purchases		222.61	
Unpaid freight and express charges		636.69	
Unpaid passenger fares		82.11	
Unpaid agreements to purchase real estate		28,434.26	
Unredeemed coupon books		73.05	
Unpaid miscellaneous		157.45	
Total			32,128.80
Net investment:			
Disbursements	$2,421,881.49		
Transfers received from other projects	87,801.45		
		2,509,682.94	
Less—			
Collections	141,492.39		
Transfers issued to other projects	32,803.87		
		174,296.26	
Total			2,335,386.68
Total liabilities, reserves, and capital investment of the Government			2,367,515.48

[1] Deduct.

Functional feature costs of Strawberry Valley project to June 30, 1914.

Development (storage) works	$510,628.60
Carriage system	1,570,294.85
Distribution system	5,765.78
Power system	71,642.17
Real estate	66,345.65
Telephone lines	14,582.51
Roads and bridges	45,048.29
Miscellaneous preliminary investigations	40,363.55
Operation and maintenance during construction	50,693.04
Cost ledger inventories	15,060.46
Gross expenditures for construction of project to date	2,390,424.90

Estimated cost of contemplated work, Strawberry Valley project, during fiscal year 1915.

Carriage system:		
Highline Canal	$250,000.00	
Mapleton lateral	50,000.00	
		$300,000.00
Distribution system:		
Highline Canal	180,000.00	
Goshen lateral	105,000.00	
		285,000.00
Power system, transmission lines		1,500.00
Real estate, grazing lands		14,217.00
Miscellaneous preliminary investigations		10,000.00
Operation and maintenance during construction:		
Guarding and maintaining completed works	10,000.00	
Power plant and transmission lines	22,000.00	
		32,000.00
Cost ledger inventories, general expense		10,000.00
Total		652,717.00

WASHINGTON, OKANOGAN PROJECT.

CALVIN CASTEEL, project manager, Okanogan, Wash.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

County: Okanogan.
Townships: 33 to 34 N., Rs. 25 to 27 E., Willamette meridian.
Railroad: Great Northern (branch line).
Railroad stations and estimated population, January 1, 1914: Okanogan, 700; Omak, 450; Riverside, 400.

WATER SUPPLY.

Source of water supply: Salmon Creek.
Area of drainage basin: 121 square miles above Conconully Dam.
Annual run-off in acre-feet of Salmon Creek at Jones's ranch, near Okanogan (140 square miles), 1903 to 1913: Maximum, 56,500; minimum, 17,350; mean, 29,900.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1914: 10,099 acres.
Area under water-right applications, rental, and vested water-right contracts, etc., to June 30, season of 1914: 9,900 acres.
Length of irrigating season: May 1 to September 1—123 days.
Average elevation of irrigable area: 1,000 feet above sea level.
Average annual rainfall on irrigable area: At Omak, Wash., four years, 8.88 inches; 1913, 11.08 inches. At Conconully, Wash., at base of Salmon River watershed, 14 years, 16.38 inches; 1913, 16.53 inches.
Range of temperature on irrigable area: —10° to 105° F.
Character of soil of irrigable area: Volcanic ash and gravel on upper benches and sand and gravel on lowlands along Okanogan River.
Principal products: Fruit, hay, grain, and vegetables.
Principal markets: States east.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: November 12, 1908; March 12, 1910; April 8, 1910; February 23, 1911; March 28, 1911; April 29, 1912; July 6, 1912; March 10, 1913; June 16, 1913; January 16, 1914.
Location of lands opened: Tps. 33 and 34 N., Rs. 26 and 27 E., Willamette meridian.
Present status of irrigable area opened: Entered subject to the reclamation act, 1,234 acres; open to entry, none; private lands, 8,393 acres.
Limit of area of farm units: Public, 40 acres; private, 40 acres.
Duty of water: 2½ acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $65. Owing to proposed reconstruction of portions of project, new contract has been executed with Okanogan Water Users' Association providing for a maximum building charge of not more than $110 per acre.

Annual rental charge: $3 per acre of irrigable land for all lands where stay of proceedings was taken advantage of; otherwise, operation and maintenance charge of $2.25 per acre.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers, October 9, 1905.
Construction authorized by Secretary, December 2, 1905.
First irrigation by Reclamation Service, season of 1908.
Conconully Dam completed, August, 1910.
Entire project completed, October, 1910.

IRRIGATION PLAN.

The irrigation plan of the Okanogan project provides for the storage of water in Salmon Lake and in Conconully Reservoir, controlled by Conconully Dam on Salmon Creek, about 2 miles below Conconully, Wash.; the control of Salmon Lake Reservoir by a short inlet canal from Salmon Creek and concrete outlet works; the control of Conconully Reservoir by means of an outlet tunnel discharging into Salmon Creek below the storage dam; the diversion of water from Salmon Creek by a dam about 12 miles below the reservoir into a canal system watering lands in the valley of Okanogan River between Riverside and Okanogan, Wash.; and the construction and operation of a pumping plant to supplement the gravity water supply for the project by pumping from the Okanogan River to 1,050 acres of land on the sandy portion of the project known as Robinson Flat, where the duty of water is less than on the heavier soils. The power for pumping will be generated at drops 1 and 2 of the upper main lateral and transmitted to the pumping station near the town of Omak by about 5 miles of transmission line.

The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating waters arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law heretofore made for the purposes of the project.

All of the features of the project—consisting of the inlet canal and outlet works to Salmon Lake; Conconully hydraulic filled dam, spillway, and outlet works; the diversion weir and distribution system—are completed and have been in use during the irrigation seasons of 1910, 1911, 1912, and 1913.

CONSTRUCTION DURING FISCAL YEAR.

Salmon Lake improvements.—During August, 1913, this work was continued and has been completed, with the exception of raising the embankment. The outlet channel was lowered 3 feet for a distance of 500 feet, involving 1,600 cubic yards of excavation. The outlet flume was completed to the outlet structure and a new concrete outlet structure with cast-iron gate installed, requiring the placing of 23 yards of concrete.

Extension of distribution system.—This work was carried on throughout the year and provides for a separate delivery of water to each individual tract throughout the project, down to a minimum of 5 acres, as the land was subdivided on October 1, 1912. During the year 13 miles of canals, with capacities less than 50 second-feet, were constructed and 600 miscellaneous wooden canal structures, costing less than $100 each, were installed. One hundred and five thousand linear feet of black iron pipe were laid, ranging in size from 4 to 14 inches and in weight from 22 to 18 gauge. This pipe was manufactured under local contract and dipped in two coats of

asphaltum in the dipping vat constructed and operated by the United States for this purpose at Omak, Wash.

Canal lining.—During the fall of 1913 and spring of 1914 the work was continued on placing a concrete lining in those portions of the canals and laterals of the distribution system where seepage conditions were found to be bad, and 19,650 linear feet of canals were lined with a plaster lining 1½ inches in thickness, placed upon a specially prepared foundation following the natural slope of the canal banks. The work required 1,370 cubic yards of concrete.

OPERATION AND MAINTENANCE.

The irrigation season of 1913 began with the turning of water into the canals on May 6 and the system was operated for 120 days during the season, which closed on September 2. The service was prepared to deliver water during the year to 10,084 acres, of which 7,700 acres, or about 76 per cent of the total area of the project, were actually irrigated. Water was delivered to 441 farms, aggregating 8,585 acres of irrigable land. The season throughout was very favorable for farming operations, on account of abundance of water and bounteous rains during the months of May and June. Due to these rains, so many requests were received from farmers to shut off their water that it was necessary at times almost entirely to suspend deliveries on the project for periods of several days each. The run-off of Salmon Creek for the year amounted to 21,545 acre-feet, which was the largest since the opening of the project, but about one-third less than the average annual run-off for the 11 years since records have been kept. This run-off, however, proved to be more than sufficient for the needs of the project, as 3,000 acre-feet remained in storage at the end of the irrigation season.

During the season the entire distribution system, including 57 miles of canals, was operated and 20,300 acre-feet of water diverted from Salmon Creek. The seepage and evaporation losses in the distribution system for the season amounted to 38 per cent, or 9 per cent less than for 1912. This decrease was due principally to the concrete lining placed in the canals during the previous fiscal year, and also partly to the silting up and sodding of the banks from the operation of the system. The total amount of water delivered to the land was 11,993 acre-feet, or 1.57 acre-feet per acre for the season. This delivery of water proved to be ample, as very little was required except for garden truck and alfalfa fields during the months of May and June. At the end of the calendar year 1913 the reservoirs of the project contained 4,330 acre-feet of water. The total operation and maintenance cost for the year 1913 was $9,640.11, which is equivalent to $1.25 per acre irrigated, or $1.06 per acre irrigable of the total area, which will subsequently be subject to operation and maintenance charges. The operation and maintenance estimate for the year was $2 per acre.

The rotative system of delivery, which has been in use during the previous seasons on the Okanogan project, was practiced during 1913 and was found to give the most satisfactory results. The period of rotation is seven days and the principal advantages of this system

are that each water user during every other week gets twice his normal delivery of water and is thus enabled to irrigate his land in less time than with the smaller head; thus the seepage losses are less and the water user is given sufficient time to do the necessary cultivating. The system was operated throughout the season with no washouts or other trouble of any consequence, and the delivery of water furnished appeared to give general satisfaction.

The season of 1914 also started off well. There was a greater snowfall than usual on the mountains forming the watershed of Salmon River during the previous winter, so that there was a good run-off into the reservoir early in the season. The weather was warm during April, which gave the crops a good start, and the soil was full of moisture from the rains and melting snows of the winter. During May, however, the weather was backward, and a heavy frost occurred on the project on May 27. The temperature dropped to 30° F. at the Weather Bureau station at Omak, and ice was formed. Considerable damage was done to garden truck and berries throughout the project, but the freeze was not severe enough to injure the fruit crop. A hailstorm occurred on portions of the project the same day which did some damage to apples, but this was largely offset by judicious thinning. On June 5 the weather continued cold, and considerable snow fell on the low foothills skirting the project.

The first water for irrigation was released from the reservoir on May 6 and preliminary deliveries made until the 19th, when the regular deliveries on the rotation schedule were commenced. The reservoirs of the projects became filled with water for the first time on May 19, and it was necessary to waste water into the Okanogan River, since the project canals and private ditches diverting from Salmon Creek could not carry the amount of water which it was necessary to release from the reservoir. The water was not allowed to overflow the spillway, since this would destroy the drainage system and weirs installed to measure the seepage water below the dam, but the outlet gates were raised and the excess water allowed to escape through the tunnel. The reservoirs continued full and overflowing practically until the end of the fiscal year, and the total amount wasted into the Okanogan River was 3,300 acre-feet, the maximum flow into the river being 110 second-feet. During this period the canals of the system were operated to their full capacity and extra water delivered to all water users who desired it. Many took advantage of the opportunity to start cover crops on the sandier lands of the project, and such water users were delivered all the water they could handle, up to the maximum carrying capacity of the system. On account of these large heads considerable trouble was experienced from leaks and washouts, and a very strict patrol was necessary to avert serious damage. Conditions at the Conconully Dam and Spillway remained normal, with the reservoir full and the flow of seepage water less than had been anticipated; in fact, this flow is becoming less each season, considering the quantity of water stored.

Irrigation water is being delivered to 450 farms this season, the total area irrigated being 7,850 acres. Crop prospects are excellent and prices are good. At the end of the fiscal year 15,200 acre-feet of water remained in storage, or only 400 acre-feet less than the total maximum storage capacity of the project.

Historical review, Okanogan project.

Item.	1909	1910	1911	1912	1913	[1] 1914
Acreage for which service was prepared to supply water.	4,550	9,500	10,051	10,051	10,084	10,099
Acreage irrigated	3,690	4,421	6,467	7,263	7,700	7,850
Miles of canal operated	41	41	41	46	47	60
Water diverted (acre-feet)	15,000	17,280	17,490	18,740	20,300	24,000
Water delivered to land (acre-feet)	9,000	9,300	8,259	9,040	11,993	15,600
Per acre of land irrigated (acre-feet)	2.5	2.46	1.27	1.24	1.57	2.00

[1] Estimated.

SETTLEMENT.

Economic conditions on the project are apparently improving, as bank statements show a substantial increase in deposits over the previous year. Very little land is changing hands, but prices are very good for improved property, ranging from $250 for the poorer soils to $600 or $700 per acre for the best improved land, with orchards coming into bearing. There is practically no demand for raw land, and in fact the price for this character of property appears to be steadily declining. Consequently the raw lands of the project are being brought into cultivation as rapidly as possible, and the few tracts that were being held for speculative reasons are coming into the hands of bona fide settlers, who will reclaim and develop them. The number of schools and churches on the project is increasing, which appears to be a sure sign of the permanency of the present population and of the work being done. Another good indication is the amount of permanent road work being carried on. During the present year about 2 miles of permanent macadamized road on an even grade were constructed under the local improvement district provision of the State law and several other similar districts have been formed for road work to be done during the coming year. These roads, after being properly graded, are surfaced with crushed rock, and will apparently remain in good condition under heavy traffic for several years. Considerable work of a similar character has also been done at county expense and by private subscription, and this work is general throughout the project.

The one condition, however, which has been the most potent in reviving economic conditions has been the completion of the Wenatchee-Oroville branch of the Great Northern Railroad. This line was completed from Oroville south past the project early in 1913, and a triweekly mixed passenger and freight train service instituted on June 2, 1913. This service continued throughout the fiscal year 1914, and was heavily patronized from the beginning, the line having more than paid expenses from the start. In the meantime the line was completed to Wenatchee and connected with the main line there, and daily train service was instituted on July 1, 1914, the present schedule calling for a mixed train leaving each end of the line each morning and making the entire run the same day, the total distance being about 140 miles. This gives an excellent opportunity for shipping out fruit and other produce and places the project on practically the same basis as the Wenatchee Valley, which has been receiving profits from the shipment of fruits for a number of years.

Settlement data, Okanogan project.

Item.	1912	1913	1914
1. Total number of farms on project	500	525	550
2. Population of (1)	1,200	1,200	1,250
3. Number of irrigated farms	432	441	450
4. Operated by owners or managers	428	439	448
5. Operated by tenants	4	2	2
6. Population of (3)	1,200	1,200	1,250
7. Number of towns	3	3	3
8. Population of (7)	1,200	1,200	1,350
9. Total population in towns and on farms, sum of (2) and (8)	2,400	2,400	2,600
10. Number of public schools	6	7	7
11. Number of churches	4	6	7
12. Number of banks	4	4	4
13. Total capital stock	$135,000	$135,000	$135,000
14. Total amount of deposits	$220,000	$250,000	$272,000
15. Total number of depositors	1,350	1,485	1,589
16. Number of relinquishments	3	2	0

PRINCIPAL CROPS.

During 1913, 287 farms, comprising 2,736 acres under the project, were cropped, the total value of the crops produced being $86,438. The principal crops raised were alfalfa, grain, timothy and clover hay, berries and truck, corn, fruit, and potatoes. Practically all of these crops, except fruit, were raised in young orchards between the rows of trees, the alfalfa and clover being for cover crops and forage for the animals maintained on the farm.

The area cropped shows a decrease of 544 acres and in total value of $33,500 from the same quantities for the year 1912. This has been due to several causes. In the first place, due to the low prices of 1912 and uncertainty of marketing conditions, many farms did not plant as large an acreage as during the previous year. In the second place, many of the orchards had reached the bearing stage and the owners thought best to devote their entire time and attention to the cultivation of the trees and not attempt to raise crops between the rows. The trees had reached such a size as to reduce the space left for crops between the rows to a very small area, which was not much greater than was required for the home garden and the income from the fruit trees was expected to replace in part at least that which had formerly been secured from the truck patches.

On July 30, 1913, the first carload of fruit (apricots) was shipped from the project over the new railroad, and during the season 13 cars were shipped, 8 cars being apples and the balance soft fruits. These shipments were made by the local branches of the Wenatchee Valley Fruit Growers' Association, but the returns were not so good as had been expected, or as were received for the consignments made by the main association. This was due to the high freight charges, on account of shipment being by the way of Oroville to Spokane and requiring two to three days' time, and to the inexperience of the local growers in packing and otherwise preparing their fruits for market. The experience was a helpful one, however, and those who made shipments last year have profited thereby and will doubtless prepare their produce this year in the most approved and modern method. There was practically no extra-fancy fruit shipped from the project in 1913, on account of two hailstorms which passed over the project and badly pitted most of the fruit. During

1914, however, there should be a large proportion of extra-fancy fruit and the indications now are for good prices. The estimate made for shipments this year is from 100 to 150 cars.

Crop report, Okanogan project, year of 1913.

Crop.	Area acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa and grain hay	1,252	Ton	3,756	3.0	$10.00	$37,560	$30.00
Berries and truck	140					7,000	50.00
Beans	14	Bushel	159	11.33⅓	3.60	571	40.80
Corn	191	Bushel	4,011	21	1.00	4,011	21.00
Pasture	47					470	10.00
Bearing orchard	924	Pound	1,045,500	1,500	.02	20,910	30.00
Nursery stock	28					2,616	92.00
Onions	2	Ton	5	2.5	30.00	150	75.00
Potatoes	161	Bushel	16,100	100	.50	8,050	50.00
Timothy and clover	204	Ton	510	2.5	10.00	5,100	25.00
Less duplicated areas	227						
Total	2,736					86,438	31.59
Irrigated, no crop:							
Fruit trees, young	5,795						
Town of Okanogan	80						
Less duplicated areas	911						
Total	4,964						
Total irrigated	7,700						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	8,585	441
Total irrigated area farms reported	7,700	441
Under water-right applications	6,144	422
Under rental contracts	190	19
Vested water rights	1,366	
Total cropped area farms reported	2,736	287

PUBLIC NOTICE DATED JANUARY 16, 1914.

Whereas, under the acts of Congress approved June 17, 1902 (32 Stat., 388), and February 13, 1911 (36 Stat., 902), a stay of proceedings looking to the cancellation of entries or water-right applications for failure to make payments when due was, on April 29, 1912, offered to landholders under the Okanogan project, Washington, and such stay of proceedings was in general accepted and the conditions thereof complied with by such landholders; and

Whereas it is the desire of many such landholders to secure patents or water-right certificates under the act of Congress approved August 9, 1912 (37 Stat., 265), which contains the provision that "no such patent or certificate shall issue until all sums due the United States on account of such land or water right at the time of issuance of patent or certificate shall have been paid":

Now, therefore, it is hereby ordered that for all lands under the said project the entrymen or owners of which shall have validly accepted the stay of proceedings offered by the said order of April 29, 1912, in the manner and form therein prescribed, and shall be and remain in good standing thereunder by having made the pay-

ments required thereby, the charges for building, operation, and maintenance which may have accrued or which would hereafter accrue against their lands under the provisions of public notices and orders theretofore issued shall be, and they are hereby, postponed until further announcement by public notice or otherwise.

Nothing herein shall be construed as a waiver or release of any payment of charges for water or water rentals prescribed by the said order of April 29, 1912.

ANDRIEUS A. JONES,
First Assistant Secretary of Interior.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Okanogan project, to June 30, 1914.

ASSETS.

Accounts receivable:		
Uncollected water rentals	$13,944.00	
Construction charges due and uncollected from water-right applicants	52,547.70	
Total		$66,491.70
Inventories:		
Animals	570.00	
Mechanical and other equipment	6,516.75	
Material and supplies on hand in storehouses	3,366.67	
		10,453.42
Construction work in process:		
Gross expenditures for construction of project to date	687,774.99	
Less revenue earned during construction, as follows:		
Rentals of cottages	$224.00	
Rentals of grazing lands	540.00	
Rentals of irrigation water	1,670.50	
Loss on mess houses	[1] 465.00	
Profits on hospitals	256.00	
Profits shown on Government animals	890.14	
Total deductions	3,115.64	
Net expenditures for construction of project to date		684,659.35
Total assets		761,604.47

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:		
Unpaid labor	948.87	
Unpaid purchases	1,714.26	
Unpaid freight and express charges	5,848.06	
Unpaid passenger fares	5.45	
		8,516.64
Reserves for repayment to reclamation fund of cost of project:		
Construction charges accrued on contracts with water-right applicants	68,934.40	
Construction charges paid in advance by water-right applicants	8,085.00	
		77,019.40

[1] Deduct.

Net investment:			
Disbursements	$739,715.79		
Transfers received from other projects	28,515.10		
		$768,230.89	
Less—			
Collections	131,785.26		
Transfers issued to other projects	10,259.21		
		142,044.47	
			$626,186.42
Total			711,722.46
Revenues in excess of cost of operation and maintenance			49,882.01
Total liabilities, reserves, and capital investment of the Government			761,604.47

Functional feature costs of Okanogan project to June 30, 1914.

Development (storage) works	$336,698.11
Distribution system	325,537.08
Real estate	7,200.00
Telephone lines	6,014.20
Farm-unit subdivisions	1,889.92
Roads and bridges	1,096.05
Miscellaneous preliminary investigations	4,603.27
Operation and maintenance during construction	4,736.36
Gross expenditures for construction of project to date	687,774.99

Operating revenues and expenses, Okanogan project, to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	3,393.01
Maintenance	504.60
Distribution system:	
Operation	9,414.41
Maintenance	15,973.47
Undistributed expenses:	
Operation	20,300.25
Maintenance	13,863.60
Revenues in excess of cost of operation and maintenance (carried to credit side of assets and liabilities statement)	49,882.01
Total	113,331.35

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$35,440.12
Rentals of lands and buildings	1,169.25
Rentals of irrigation water	76,706.80
Miscellaneous revenues	15.18
Total	113,331.35

Estimated cost of contemplated work, Okanogan project, during fiscal year 1915.

Development (storage) works:		
Salmon Lake Dam	$1,500.00	
Road repairs	1,500.00	
Drainage system in town of Conconully	2,500.00	
		$5,500.00

Distribution system:			
Extension of distribution system		$10,000.00	
Robinson Flat pumping plant—			
Power plant No. 1	$12,877.00		
Power plant No. 2	13,255.00		
Pumping plant	38,600.00		
Transmission line	5,491.25		
Engineering and contingencies	14,076.75		
		84,300.00	
Concrete lining of canals		35,000.00	
			$129,300.00
Operation and maintenance during construction:			
Development		1,500.00	
Carriage		1,500.00	
Distribution		8,000.00	
General expense		5,000.00	
			16,000.00
Total			150,800.00

WASHINGTON, PALOUSE PROJECT.

ERNEST MCCULLOH, engineer, Sunnyside, Wash.

IRRIGATION PLAN.

The Palouse project contemplates the reclamation of a large area of desert land in Franklin County, Wash., lying below the 700-foot contour and extending north from the Columbia and Snake Rivers to the town of Eltopia.

HISTORICAL REVIEW.

During the period of 1902 to 1905 extensive investigations were carried on by a corps of engineers of the service to ascertain the feasibility of the project. Surveys of the irrigable lands and canal lines were made in connection with the mapping of several dam and reservoir sites for storing and diverting the water of the Palouse River to the lands, and plans and estimates of the scheme were prepared by the engineers. These were revised by various boards of consulting engineers late in 1905, the conclusions and decisions of these boards resulting in the department laying aside further consideration of the scheme for more favorable projects then under review.

Agitation by public-spirited citizens in Whitman and Franklin Counties resulted in the enactment by the Legislature of the State of Washington, during the session of 1912–13, of a bill authorizing the governor of the State to make all necessary surveys for ascertaining the feasibility of the reclamation of the lands under the Palouse project, and appropriating $10,000 for carrying on the work.

The passage of this act made it possible for the reinvestigation of the scheme. Upon the solicitation on the part of the State officers the matter of cooperation with the General Government was taken up. This invitation was entertained and resulted in the Secretary of the Interior appropriating a like sum as set aside by the State, and in the consummation of an agreement dated November 18, 1913, between the State of Washington and the United States under which the work is being carried forward.

The reinvestigations began in December, 1913. The 1st day of December was devoted to conferences with C. H. Swigart, supervising engineer of the Washington division, at North Yakima and with the governor of the State at Olympia as to the methods of procedure and accounting. Following these conferences examinations were made of the maps and reports prepared by the former engineers from surveys and data secured in the previous investigation. This was done in order to become familiar with the work done by the former engineers and that no work in the future would be a repetition of the former investigation. The work done and the material prepared by the former engineers was extensive and of extreme value in the present investigation, and has greatly reduced the extent of the present operations.

In order to gain a general knowledge of the nature of the country and the proposed project a number of trips were made. These included visits to all dam and reservoir sites and routes of canal lines surveyed by the former engineers. Examinations were made of the Rock Lake, Washtucna, and Winona dam and reservoir sites, and the Washtucna and Esquatzel coulees, through which surveys were made for canal lines for transporting the water to the irrigable lands. Examination of the irrigable lands was also made and a number of irrigated tracts in the Columbia and Snake River basins were inspected and examined to obtain data as to results and quantity of water required. This information is valuable, as it will have a direct bearing upon the quantity of water required on the lands under consideration.

SURVEYS.

Late in December, 1913, a reconnoissance survey was begun of the drainage area of the Palouse River for possible dam and reservoir sites. The upper tributaries were first examined. These were followed by examinations lower down the stream until the whole drainage area was investigated.

Of the many sites examined only four presented sufficient surface and topographic features to warrant further consideration and survey. These favorable sites are known as the Wiedrich, Hinchliff, State Line, and Potlatch Reservoirs.

On February 19, 1914, a field party was organized to make topographic surveys of these reservoirs, beginning work on the Wiedrich site. After its completion the party was transferred to Winona Reservoir site to make a survey for the relocation of the railroad which traverses a portion of this reservoir. The Winona site was at one time considered by the former engineers as a possible reservoir, they having made a partial survey of this site. In their final report of findings, however, the reservoir was not considered as a part of their scheme. The present investigation has given this site consideration, and a survey has therefore been made for the relocation of the railroad above the flood line of the reservoir.

Following the completion of this survey the party was moved to the Hinchliff site and then to the State Line and Potlatch sites in the order named. The Potlatch site is traversed by the Washington, Idaho & Montana Railroad. After the party completed the survey of the reservoir, a number of lines were run to ascertain the most economical route for a railroad over the proposed dam at this site.

Owing to the incomplete survey of the Winona site as made by the former investigators, it was considered necessary to make a resurvey of this reservoir. Accordingly, on the completion of the Potlatch survey the party was moved to Winona and a resurvey made of this reservoir.

The area and the number of miles of line run for the relocation of railroads at the various sites by this party are as follows:

	Area.	Miles.
Wiedrich	2,708	.....
Winona	3,304	5.5
Hinchcliff	500	.....
State Line	1,596	.....
Potlatch	4,490	5

A second field party was organized on February 25 to make surveys for canals and secure data for power development, beginning operations on the Palouse River in the vicinity of Hooper. Topographic surveys were made of a number of favorable sites for diversion dams, and the territory on both sides of this stream was mapped for a distance of 4 miles above and 2 miles below the town, or to a point covered by surveys made under the former engineers. It was then found unnecessary to make a complete survey of the country between Palouse Falls and Washtucna Lake, as topographic maps of this territory had been prepared by the former engineers. However, it was found necessary to supplement these maps with additional data to meet present requirements, which was done.

Following the completion of the surveys in the vicinity of Hooper the party was moved to Connell, from which point surveys were continued for canal lines from Washtucna Lake to Connell on the north side of Washtucna coulee. After completion of this work the party surveyed several lines for estimating power development below Connell in Esquatzel coulee. The aggregate area mapped and the length of canal lines surveyed by this party amounted to 8,900 acres and 46.6 miles, respectively.

Water supply.—In connection with the study of water supply it was considered advisable to establish a number of gauging stations on the streams in the watershed in order to verify and supplement the present available data. Nine such stations were arranged for, three of which are reestablishments of stations established by the former engineers and abandoned shortly after the previous investigation closed.

Test pits.—To ascertain the character of the foundation at the Wiedrich and Winona dam sites a number of pits were dug and holes drilled at these sites. The location of these holes and pits have been mapped and samples of the material penetrated and encountered obtained. These data have revealed the character of the substrata at the sites, and have been very valuable in the preparation of estimates of the cost of the construction of dams at these points.

Soil survey.—An extensive soil survey of the irrigable lands is in progress. A large number of borings have been made and samples of the soil have been secured. The field work of this survey has been completed, but the laboratory work is now in progress, and is being done by an expert of the Bureau of Soils at the State College at Pullman, Wash.

At the completion of all field work in connection with the present investigation the office at Colfax was closed and the office force moved to Sunnyside, where all future work in connection with the preparation of estimates and reports will be completed.

A general map has been prepared which shows the location of the various reservoirs mapped and the lines run by the field parties under the present investigation.

WATER APPROPRIATIONS AND FILINGS.

The United States has taken action on behalf of the Palouse project to secure an adequate water supply should the project be undertaken. Under date of June 30, 1913, the supervising engineer executed a notice of withdrawal, which was promptly filed in the

office of the commissioner of public lands of the State of Washington, claiming an appropriation of all the unappropriated waters in the Palouse River above section 1, township 14 north, range 36 east, and the tributaries of the Palouse River, including the following:

Palouse River above section 1, township 14 north, range 36 east, Willamette meridian, also tributary thereto Cow Creek, Cow Lake, Middle Lake, Big Swamp Lake, Colville Lake, Union Creek, Rock Creek, Cottonwood Creek, Rock Lake, Thorn Creek, Squaw Creek, Pine Creek, Cabbage Creek, Rock Creek Lake, Chapman Lake, Phillea Lake, Wassup Creek, Pleasant Valley Creek, Clear Creek, together with their branches and tributaries.

This notice held the waters so filed upon from appropriation on the part of any other person or corporation for the period of one year. Subsequently, under date of June 3, 1914, the supervising engineer filed a certificate of the project stating that preliminary surveys indicated the feasibility of the project and that examinations in detail would be made. The filing of this second certificate under the State law in question, that of March 4, 1905, will hold the waters so appropriated for a period of three years.

FINANCIAL STATEMENTS.

The assets and liabilities are shown in the financial statement for the secondary projects. The costs are given in the functional feature cost report which follows the above statement and the net investment is given in Tables 11 and 12 in the appendix.

WASHINGTON, YAKIMA PROJECT.

R. K. TIFFANY, project manager, Sunnyside and Tieton units, North Yakima, Wash.; J. G. HEINZ, assistant manager, Sunnyside unit, Sunnyside, Wash.; G. C. FINLEY, assistant manager, Tieton unit, Naches, Wash.; C. E. CROWNOVER, project manager, storage unit.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Yakima, Benton, and Kittitas.

Townships: 8 to 22 N., Rs. 11 to 25 E., Willamette meridian.

Railroads: Northern Pacific; Chicago, Milwaukee & St. Paul; Oregon-Washington Railroad & Navigation Co.

Railroad stations and estimated population January 1, 1914: Grandview, 700; Sunnyside, 1,400; Outlook, 150; Granger, 500; Zillah, 400; Mabton, 700; Byron, 50; Prosser, 1,400; Ellensburg, 5,000; Thorp, 300; Yakima, 200; North Yakima, 16,500; Naches, 500; Wapato, 500; Toppenish, 1,700; and Parker, 50.

WATER SUPPLY.

Source of water supply: Yakima River and tributaries.

Area of drainage basin: 5,270 square miles.

Annual run-off in acre-feet of Yakima River at Union Gap, 3,300 square miles; 1897 to 1913—maximum, 4,370,000; minimum, 2,390,000; mean, 3,330,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1914: Sunnyside unit, 81,306 acres; Tieton unit, 34,071.8 acres.

Area under water-right applications and rental contracts, season of 1914: Sunnyside unit, 71,426 acres; Tieton unit, 24,655.74 acres.

Length of irrigating season: Sunnyside unit, April 1 to October 31, 214 days; Tieton unit, May 1 to October 1, 153 days.

Average elevation of irrigable area: 1,000 feet above sea level.

Average annual rainfall in irrigable area: At Sunnyside, 1895 to 1913, 6.56 inches; 1913, 6.82 inches. At North Yakima, 1909 to 1913, 6.25 inches; at Tieton, 1913, 7.88 inches.

Range of temperature on irrigable area: —21° to 110° F.

Character of soil of irrigable area: Sunnyside unit—on about three-fourths of the unit the soil is sandy loam or volcanic ash from 10 to 60 feet deep. The remainder is decomposed basalt, underlain by gravel or a combination of this with the above-named soils. Tieton unit—volcanic ash.

Principal products: Forage, hops, vegetables, and fruit; stock and dairy products.

Principal markets Seattle, Tacoma, and Spokane, Wash., Alaska, and eastern cities.

LANDS OPENED FOR IRRIGATION.

SUNNYSIDE UNIT.

Dates of public notices: November 18, 1908; March 2, 1909; April 18, April 19, May 2, 1910; March 15, 1911; February 29, May 31, 1912; June 16, June 23, October 2, 1913; March 10, April 11, 1914.

Location of lands opened: Tps. 8 to 12 N., Rs. 19 to 25 E., Willamette meridian.

Present status of irrigable lands opened: 1,500 acres entered subject to reclamation act; 600 acres of State lands; 79,206 acres in private ownership.

Duty of water: 3 acre-feet per acre per annum at the farm.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Building charge per acre of irrigable land: $52.

Annual operation and maintenance charge: $0.95 per acre of irrigable land.

TIETON UNIT.

Dates of public notices and orders: November 7, 1910; March 8, April 14, 1911; January 24, February 21, April 18, May, 10, 1912; March 21, April 25, June 16, 1913; March 4, 1914.

Location of lands opened: Tps. 12 to 15 N., Rs. 16 to 19 E., Willamette meridian.

Present status of irrigable land: 1,852.03 acres entered subject to the reclamation act; 323.63 acres opened to entry; 2,274 acres State land; 329 acres railroad land; 22,803.71 acres in private ownership covered by water-right application; 6,489.43 acres in private ownership, unapplied for.

Duty of water: 2.17 acre-feet per acre per annum at the farm.

Limit of area of farm units: Public, 40 acres; private, 160 acres.

Building charge per acre of irrigable land: $93.

Annual operation and maintenance charge: $1.50 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys in 1903.

Report of board of engineers recommending construction October 16, 1905.

Construction of Sunnyside and Tieton units authorized by Secretary December 12, 1905; Wapato unit, June 16, 1906.

Sunnyside Canal purchased June 23, 1906.

First irrigation by Reclamation Service, Sunnyside unit, season of 1907.

Tieton diversion dam completed December, 1908.

Tieton Main Canal completed in 1909.

Bumping Lake Dam completed in 1910.

First irrigation by Reclamation Service, Tieton unit, season 1911.

Distribution system, Sunnyside unit, completed in 1911.

Tieton unit completed winter 1911–12.

Kachess Dam completed fall of 1912.

Warren Act contract with Kittitas reclamation district executed by Secretary of Interior January 18, 1913.

Per cent completed June 30, 1914: Storage unit, 25.7 per cent; Sunnyside unit, 89 per cent; Tieton unit, 94 per cent.

IRRIGATION PLAN.

The irrigation plan of the Yakima project provides for the storage of flood waters of the Yakima River and its tributaries in Kachess, Keechelus, Clealum, and Bumping Lakes, and in a reservoir at McAllister Meadows; the diversion of water from the Yakima River for the irrigation of 62,000 acres of land on both sides of the river in the vicinity of Ellensburg, comprising the Kittitas unit; the diversion of water from the east bank of the Yakima River near Parker for the irrigation of 100,000 acres of land by means of the old Sunnyside Canal, as improved and extended by the Reclamation Service, comprising the Sunnyside unit; the diversion of water from the Tieton River below McAllister Meadows, a reservoir being provided on the headwaters of this stream to regulate diurnal flow, for the irrigation of 34,000 acres of land lying between the Naches River and Ahtanum Creek, in the vicinity of North Yakima, comprising the Tieton unit; and the diversion of water from the west bank of the Yakima River near Parker for the irrigation by means of the canal system of the Yakima Indian Reservation, improved and extended, of 106,000 acres of land by gravity and 14,000 acres of land by pumping with power developed at drops in the canals, comprising the Wapato unit. The plan also provides for the development of power from drops in the main canals and laterals of the Sunnyside and Tieton units to be used for pumping irrigation water and for other purposes. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The following features of the above plan have been completed: Sunnyside unit—Diversion dam, enlargement of main canal, Sulphur Creek wasteway, and the distribution system, with the exception of small laterals, etc., to lands not yet applied for. Tieton unit: Bumping Lake storage dam, extension of Tieton Canyon road to site of Clear Creek regulating reservoir on the headwaters of the Tieton River, Tieton River diversion dam, main canal, and distribution system. Storage unit: Kachess Dam; construction work is in progress on Clear Creek regulating reservoir; Keechelus Dam, the clearing of reservoir

sites at Bumping Lake, Lake Kachess, Keechelus, and Clealum. The features for future construction are: Sunnyside pumping plants, necessary distribution systems on the Sunnyside unit, Benton City extension to the Sunnyside unit, Clealum and McAllister Meadows Reservoirs.

STORAGE UNIT.

CONSTRUCTION DURING FISCAL YEAR.

General.—At the headwaters of the Yakima River and its tributaries are the reservoir sites which, when developed, will impound the water to be used to irrigate the lands under the Yakima project. Prior to this year the Bumping Lake and Kachess Lake Reservoirs were completed.

KEECHELUS DAM.

Description.—Keechelus Dam is located at the foot of Lake Keechelus, in Kittitas County, Wash. It is to be of the earth and gravel type, 6,500 feet long, maximum fill of 68 feet, and will contain approximately 522,000 cubic yards of material. The top width will be 20 feet, with upstream slope 3 to 1 and downstream slope 2 to 1. A wide cut-off trench will be excavated the full length of the dam and a cut-off wall constructed where the looseness of the material justifies this construction. The present lake level will be lowered 40 feet by means of the outlet works, which will be 4,300 feet long, 500 feet of which will be a 12 by 12 foot horseshoe-type conduit under the dam and the remaining 3,800 feet an open channel. A spillway, with a crest length of 300 feet, which will discharge 10,000 cubic feet per second with a 4.5-foot head, will be located at the north end of the dam and adjacent thereto.

Body of dam.—During the year just passed the work of grubbing and stripping on the dam site was finished, and the cut-off trench on the dam from station 0 to 45 was completed, a concrete core wall was constructed for a distance of 2,000 feet, and a sheet piling core wall for 2,000 feet. The cut-off trench from stations 19 to 40 was back filled, puddling the material to the top of the core wall or 4 feet above the bottom of the cut-off trench, and for filling the remainder of the trench the spreading, sprinkling, and rolling method was used. In May, 1914, this method of construction was started and by the end of the fiscal year 21,000 cubic yards had been placed. The tight material used in the back fill of the cut-off trench and for building the embankment is obtained in a borrow pit at the north end of the dam. It is excavated with a steam shovel, hauled with dinkeys on a narrow-gauge track, and spread with wheel scrapers and fresnos. Gravel for the lower side of the embankment is obtained from a pit at the south end of the dam and transported to the dam site in the same manner as the fine material.

Outlet works.—In connection with the construction of a 3,300-foot tunnel in the outlet works, as first proposed, the adit at station 27 was completed and two top tunnel headings started from it. The length of one was 51 feet and the other 27 feet. The shaft at the lake end of the tunnel was completed early in the year and two top tunnel headings excavated, one a distance of 71 feet and the other a

distance of 50 feet. Heavy ground under high water pressure was encountered, and after a meeting of a board of consulting engineers the tunnel scheme was abandoned.

The revised scheme of the outlet works raised the storage datum 20 feet and consists mostly of an open cut. The clearing and grubbing of this revised location was completed and the excavation of the revised channel is about 10 per cent completed. A drag-line excavator worked at the lower end and a dipper dredge at the upper or lake end.

Spillway.—Little work was done at the spillway site. Some of the earth overlying the bedrock was excavated with teams early in the year.

General.—A hydro-electric power plant to develop 400 horsepower was completed early in the year. A rock crushing and screening plant, which will furnish aggregate for concrete materials, and also a concrete mixing plant were constructed. At the end of the fiscal year the Keechelus Dam and auxiliary structures were 38 per cent completed. The principal items of work accomplished were: Clearing, 29 acres; grubbing, 21 acres; excavation, 257,750 cubic yards; concrete, 1,044 cubic yards; embankment, 35,200 cubic yards; riprap, 500 cubic yards; and sheet piling, 11,120 linear feet of penetration.

LAKE CLEALUM.

A few minor repairs were made to the rock-filled crib dam at Lake Clealum. A survey party was put in the field late in the year to make further investigations in connection with a proposed tunnel outlet from the lake.

CLEARING RESERVOIR SITES.

A portion of the reservoir area at Bumping Lake, Lake Clealum, Lake Kachess, and Lake Keechelus is covered with a heavy growth of timber which must be removed before the water surface is raised in the reservoir.

The work at Lake Kachess, Clealum, and Keechelus was covered by contract, although the contract for that at Kachess was suspended, and this work, together with that at Bumping Lake, is being done by the United States.

Lake Kachess.—During the year approximately 5,000,000 feet, board measure, of merchantable timber were cut and skidded into the lake. A small sawmill was erected during the latter part of the year for cutting ties and cordwood, and 450 cords of wood have been cut. About 370 acres have been cleared and 450 acres logged.

Lake Clealum.—Contractor Walsh has made fair progress on his contract, having cut about 2,800,000 feet, board measure, of timber. According to the cruise, the work on the clearing of this timber is about 35 per cent completed.

Lake Keechelus.—Very little work has been done on the Flanagan contract for clearing reservoir site at this lake. Approximately 300,000 feet, board measure, of timber have been cut.

SUNNYSIDE UNIT.

CONSTRUCTION DURING THE FISCAL YEAR.

Work was continued on the enlargement of Snipes Mountain lateral, between miles 2.3 and 3.1, where approximately 2,200 cubic yards of material were removed from the canal section and used to strengthen the banks of the high fill at this point. Work on the general distribution system was continued, consisting of such work as was necessary to make deliveries to units just completing water-right application. The present policy is to do only what is necessary to complete the distribution system as the work is called for by receipt of applications for water on new land. Work on completing the distribution system consisted in the installation of some 30 deliveries with the necessary sublaterals, small flumes, etc., and the construction of one 8-inch turnout from the Main Canal.

OPERATION AND MAINTENANCE.

Operation.—The operation of the Sunnyside Canal and distribution system, from July 1, 1913, to the close of the irrigation season, November 1, 1913, was without incident other than the ordinary routine. The irrigation season of 1914 was begun on March 16, when approximately 50 second-feet were diverted from the river at the intake for priming the canal. With the exception of the complaints because of the delayed water service in the early season, comparatively few have been made this year, and most of these were requests for excess delivery. All complaints have been investigated promptly, and, where found necessary, steps have been taken to remedy them.

The maximum head of water diverted during the year was 920 second-feet and the average 747 second-feet, the actual deliveries having been 3.31 acre-feet per acre. Water is now being delivered to 64,100 acres, an increase of 1,300 acres over the acreage served at the close of the preceding fiscal year. There will be an increased acreage served during 1914, because at present the maximum acreage that will be irrigated has not yet been attained. The total area for which water is available from the Sunnyside Canal is 81,306 acres, classified as follows:

Kind of water right.	Acres.	Rate.	Amount.
Konnewock	3,080.00	Free.	
Served on rental basis	300.00	$2.50	$750.00
Washington Irrigation Co.	14,673.00	1.00	14,673.00
Do	912.20	.50	456.10
Do	34.80	1.50	52.20
Washington Irrigation Co. and additional Government water right	28,402.00	.95	26,981.90
Declared available by public notice	33,904.00	.95	32,208.80
Total	81,306.00		75,122.00

Maintenance.—Maintenance work consisted of the necessary work to keep the main and branch canals in proper condition, the correction and prevention of erosion, strengthening of canal banks, and clearing of right of way, as well as the repair and renewal of such measuring boxes and structures as were found in poor condition. One unusual feature of the maintenance work was brought about by the condition found to exist along the Mabton siphon. As a result of

a board report on the condition of the Mabton siphon, it was determined to uncover the siphon, leave such portions as had been back filled uncovered, and paint the whole of the wood portion of the siphon. This work was started late in the irrigation season of 1913 and continued during the winter, having been finished at the opening of the irrigation season of 1914.

Historical review, Sunnyside unit.

Item.	1909	1910	1911	1912	1913	1914
Acreage for which service was prepared to supply water	58,360	61,245	71,756	80,076	80,607	81,306
Acreage irrigated	44,375	48,255	51,040	58,560	62,800	64,100
Number of farms irrigated	1,600	1,818	2,221	2,441	2,450	2,448
Miles of canal operated	400	434	500	513	525	525
Water diverted (acre-feet)	245,851	262,008	275,465	314,733	312,032	316,828
Water delivered to land (acre-feet)	154,427	158,611	157,419	179,308	194,725	211,902
Per acre of land irrigated (acre-feet)	3.480	3.287	3.084	3.062	3.101	3.31

SETTLEMENT.

While there has been less immigration during the past year than for several preceding years, there has at the same time been a steady and consistent general growth and development, chiefly in the way of improved methods of farming, increase of stock, and the elimination of the speculating farmer.

On the face of the returns the production of crops for the Sunnyside unit for 1913 was below that of 1912, but the net returns were higher and the outlook for 1914 is excellent for increased gross and net returns as compared with 1913. The process of stocking the farms is well under way throughout the project, and while this means in most cases increased debt, this is being rapidly reduced or wiped out with a constant increase in returns to the ranch.

There has been little or no growth in towns and villages during the past year, but much has been accomplished in the way of permanent improvement, particularly in the line of construction of roads and trunk drains. The drainage construction is done under the State drainage district law and some 10 or a dozen trunk drains have been built, in all cases resulting in the improvement of adjacent waterlogged and alkalied lands.

Settlement data, Sunnyside unit.

Item.	1912	1913	1914
1. Total number of farms on project	2,441	2,450	2,448
2. Population of (1)	7,000	7,322	6,900
3. Number of irrigated farms	2,441	2,450	2,448
4. Operated by owners or managers	[1]	[1]	1,912
5. Operated by tenants	[1]	[1]	536
6. Population of (3)	7,000	7,322	6,900
7. Number of towns	13	13	13
8. Population of (7)	[1]	6,880	5,300
9. Total population in towns and on farms, sum of (2) and (8)	[1]	14,202	12,200
10. Number of public schools	32	34	34
11. Number of churches	[2]	[2]	30
12. Number of banks	[2]	[2]	9
13. Total capital stock	[2]	[2]	$260,000
14. Total amount of deposits	[2]	[2]	$1,248,000
15. Total number of depositors	[2]	[2]	3,000

[1] No record kept.
[2] Data not obtained in former years.

PRINCIPAL CROPS.

The principal crops grown are fruits, including peaches, apples, pears, cherries, grapes, melons, etc.; forage crops, consisting principally of alfalfa, timothy and clover or grain hay; and vegetables, of which potatoes are the principal crop, while cabbage, asparagus, tomatoes, eggplant, onions, and other garden products are being planted in increasing quantities as their value and the methods of handling become better known. The fruit crop for 1913 was not as large and the gross yield was not as high as for 1912, but the net profits were greater for the grower because of the higher unit prices realized and decreased expense of handling.

Alfalfa continues to be the largest crop in acreage, 24,100 acres having been cut in 1913. Quite an area of alfalfa land was plowed up and planted to corn and potatoes, but the newly seeded area was sufficient to increase the alfalfa acreage approximately 2,000 acres. There was a decrease in acreage of timothy and clover, largely accounted for by an increase in pasture lands.

There was a large increase in the acreage planted to corn and potatoes in 1913. The increase in stock and dairying continues to be one of the most noticeable features of the development throughout the project, the increase in cattle and hogs for 1913 compared with 1912 amounting to 85 and 115 per cent, respectively. The development in dairying has resulted in the installment of a cooperative creamery at Sunnyside controlled by ranchers. This creamery has been a success, and in turn resulted in a further stimulation of the dairy business. The tendency toward rapid increase in orchard area has been checked for the present by poor net returns from the large crop of 1912 and the rather alarming condition that prevailed the past year because of the fire blight. However, the organization of the Yakima Fruit Growers' Association and getting control of the fire-blight situation have brought about a more optimistic view of the fruit situation, and while no rapid increase of the orchard area will come, there will undoubtedly be a gradual and consistent development.

The total estimated value of the crop return for 1913 was $2,820,786, an average return of $61 per acre cropped. This estimate is not strictly comparable with previous estimates, because for the first time the estimate, for both value and yield, was made largely by the farmers themselves. This no doubt resulted in more conservative estimates, both as to value and yield. The average value of stock per farm was $550, as compared with $400 in 1912.

The prospects for 1914 indicate an unusually large fruit crop, as well as an alfalfa yield above normal, and an excellent crop of corn and potatoes.

Crop report, Yakima project, Sunnyside unit, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa hay	24,137	Ton	120,685	5	$7.00	$844,795	$35
Apples	6,291	Pound	26,169,150	4,160	.024	618,171	98
Clover hay	1,121	Ton	3,923	3½	8.00	31,384	28
Corn	4,516	Bushel	225,800	50	.70	158,060	35
Small fruit	461					59,401	129
Garden	657					66,028	100
Hay, except above	1,783	Ton	5,349	3	10.00	53,490	30
Hops	159	Pound	300,952	1,893	.25	75,238	473
Pasture	2,322					69,660	30
Peaches	1,186	Pound	7,116,000	6,000	.013	92,508	78
Pears	594	do	4,983,960	8,390	.025	124,599	209
Prunes	198	do	1,980,000	10,000	.027	54,067	273
Potatoes	4,694	Bushel	1,239,216	264	.45	557,647	119
Wheat	141	do				4,196	30
Miscellaneous	313					11,542	37
Less duplicated areas	2,343						
Total	46,230					2,820,786	61
Irrigated, no crop:							
Young orchard	9,831						
Young alfalfa	2,361						
Building sites, city and town area	3,929						
Less duplicated areas	4,051						
Total	12,070						
Total irrigated	58,300						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	64,400	2,448
Total irrigated area farms reported	58,300	2,448
Under water-right applications	19,400	805
Under rental contracts	38,900	1,643
Total cropped area farms reported	46,230	2,448

PUMPING PLANTS AND BENTON CITY EXTENSION.

Irrigation districts have been organized under the State law covering lands irrigable from the Sunnyside Canal and distribution system through pumping units, which have always been considered as a part of the system, and through an extension of the main canal.

The Sunnyside irrigation district (Benton City extension) comprises about 4,500 acres of land, lying east of the completed portion of the project and tributary to Benton City. This district has been organized for nearly two years and has voted bonds and complied with the requirements of the Secretary of the Interior as to reduction of individual land holdings to 40-acre units. It is expected that a contract will be entered into providing for the necessary construction to deliver water to this district in the spring of 1915. Classification of the district lands has been made, the canal line is located, and plans and specifications have been prepared.

The Snipes Mountain irrigation district comprises about 2,000 acres. It is irrigable by means of direct hydraulic pumping units, utilizing the power from drops in the gravity distribution. About 400 acres of the land in this district have been irrigated for several

years by private pumping plants. The district has voted bonds to cover the estimated cost of construction, individual land holdings have been reduced to units of 40 acres or less, and it is hoped that a contract will be entered into at an early date providing for the construction of the pumping plant and distribution system, so that water may be delivered in the spring of 1915.

The Grandview and Outlook irrigation districts comprise about 4,800 and 4,500 acres, respectively, the lands lying above the main Sunnyside Canal and north of the towns of Grandview and Sunnyside. They have been organized into irrigation districts under the State law and have taken the necessary steps to comply with the requirements of the Secretary of the Interior prior to execution of contracts covering the construction.

Surveys and estimates for the distribution system and design and estimate of a pumping plant for the Snipes Mountain district are practically completed, and surveys for the Grandview and Outlook districts are well under way, but final location has not been made.

The construction of these extensions of the Sunnyside unit will make available large bodies of the very best farming lands, some being State lands, some Government lands, and the balance in private ownership. It is believed that these lands will be obtainable at reasonable prices and will afford the best of opportunities for home making to 200 or 300 families.

TIETON UNIT.

CONSTRUCTION DURING THE FISCAL YEAR.

Canyon division.—The work of installing the new design of automatic spillway at Main Canal wasteway No. 2 was done by Government forces during May and June, 1914.

Distribution system.—Extension and supplemental construction in connection with the pipe lines and main laterals were accomplished.

Tieton River storage.—The construction of a wagon road from the headworks of the Tieton Main Canal, by way of the site of the permanent dam at McAllister Meadows, to the site of the Clear Creek regulating reservoir was completed October 20, 1913. This consisted of 8 miles of permanent road leading to the site of McAllister Dam and 7 miles of temporary road from McAllister to the site of the Clear Creek Dam. Investigations of the foundation at the proposed Clear Creek Dam site by wash and diamond-drill borings were made during the fall of 1913 and spring of 1914. The purpose of the Clear Creek Dam is to form a regulating reservoir to take care of the diurnal flow of the Tieton River during the summer months, and to provide storage to cover water deficiency during the months of July and August. Construction of this dam was commenced April 14, 1914.

Clear Creek regulating reservoir is located just below the mouth of Clear Creek on the North Fork of Tieton River, about 15 miles from the summit of the Cascade Mountains. The dam is to be of a single-arch type, ultimate height, 78 feet; height for first develop-

ment, 35 feet; storage under first development, 3,000 acre-feet; under final development, 8,000 acre-feet. Thickness at base, 10 feet 3 inches; radius at top, 128 feet; radius at bottom, 104 feet 8½ inches; length of arch, 160 feet; gravity section at each end.

The outlet works consist of two 36-inch pipes through the dam with the usual gates and operating devices. There will be provision made for a short spillway in the final development. The present spill, however, will be over the crest.

A tent camp for 150 men has been erected, the necessary flume and cofferdam for diverting the river are nearly completed, and the erection of the plant for construction is 75 per cent completed.

Bumping Lake.—Sufficient storage water was released so that by August 20, 1913, a crew was started on the cutting of timber covering the reservoir area, and approximately 200 acres were cut and piled for burning during the remainder of that season. The work opened in April, 1914, and the entire area which had been cut and piled was burned. Approximately one-third of the débris was completely burned; the remaining logs have been floated down the lake and boomed in, and by use of a donkey engine drawn out and piled and burned.

OPERATION AND MAINTENANCE.

At the end of the fiscal year the total area for which water is available had been reduced to 34,071.8 acres by various amendments to the farm-unit plats. Of this area, 19,750 acres were receiving water June 30, 1914. A rotation schedule is in force throughout the entire project, the major portion being 7 days on and 14 days off, and a minor portion 7 days on and 7 days off. The division between these two methods is governed entirely by soil conditions. During the season the Main Canal and distribution system have been in operation without interruption. It is estimated that 22,000 acres will be irrigated this season.

Historical review, Tieton unit.

Item.	1909	1910	1911	1912	1913	1914 [1]
Acreage for which service was prepared to supply water	.....	10,082	19,378	34,700	34,000	34,071.8
Acreage irrigated	.....	1,695	7,115	15,008	18,750	21,000
Miles of canal operated	.....	.....	166	260	335	335
Water diverted (acre-feet)	.....	7,830	22,698	47,675	59,509	65,000
Water delivered to land (acre-feet)	.....	.....	6,311	33,811	42,539	45,000
Per acre of land irrigated (acre-feet)	.....	1.73	1.91	2.27	2.27	2.30

[1] Estimated.

SETTLEMENT.

The growth and general development of the Tieton unit during the past year have shown a marked increase over any previous season. A census of the population for 1913 showed 1,622 persons actually living on the farms. A large number who previously lived in town have recently moved onto their lands and are now personally

doing their developing. There are at present approximately 8,000 acres planted to fruit trees, which are now from 2 to 5 years old. On unit 1 there will be a few orchards in bearing this season. There is a growing interest in diversified farming, shown by such activities as dairying, hog raising, careful crop rotations, etc. Good progress has been made by the settlers actually living on their lands in developing their holdings, and with few exceptions they are in a position to secure good crops and expect reasonable returns. There has been much activity in the development of county roads and agitation for other methods of transportation. At present the only organization which enables the farmers to dispose of their products is the branch of the Yakima Valley Fruit Growers' Association located at Cowiche.

Settlement data, Tieton unit.

Item.	1912	1913	1914
1. Total number of farms on project	875	900	1,000
2. Population of (1)	1,174	1,622	2,000
3. Number of irrigated farms	875	900	1,000
4. Operated by owners or managers [1]			
5. Operated by tenants [1]			
6. Population of (3)	1,174	1,622	2,000
7. Number of towns (on and adjacent to project)	7	7	7
8. Population of (7) (approximate)	14,000	15,300	18,000
9. Total population in towns and on farms (sum of 2 and 8)	15,174	16,922	20,000
10. Number of public schools	6	9	10
11. Number of churches [2]	3	3	3
12. Number of banks [3]			
13. Total capital stock [1]			
14. Total amount of deposits [1]			
15. Total number of depositors [1]			

[1] Information not available.
[2] Not including schoolhouses at which services are held.
[3] None actually on project.

PRINCIPAL CROPS.

The Tieton lands are largely devoted to raising alfalfa, grain, hay, corn, barley, rye, wheat, oats, potatoes, onions, garden truck, and small fruits. A large acreage has been set to fruit trees, the custom of raising any of the above crops between the rows being generally practiced during the development stage of the orchard.

During the season of 1913 there was an increase in the average production per acre over previous seasons. A heavy increase is noted in the production of all kinds of forage crops.

There is a marked decrease in the amount of land planted to potatoes in 1914, and a similar increase in the acreage planted to corn, while considerable land is being newly seeded to alfalfa. There has been very little development in the way of putting out new orchards during the past two years. The crop yields for 1914 will probably be better than any in the past.

Crop report, Yakima project, Tieton unit, year of 1913.

Crop.	Area, acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa hay	3,284	Ton	11,251	3.4	$7.15	$80,110	$24.40
Apples	394	Pound	1,481,490	3,760	.02	29,849	75.80
Barley	136	Bushel	4,650	34.2	.62	2,897	21.30
Beans	223	Bushel	1,192	5.4	2.03	2,427	10.90
Clover hay	325	Ton	729	2.2	8.15	5,718	17.60
Corn, Indian	1,088	Bushel	28,410	26.1	.65	18,582	17.10
Corn fodder	195	Ton	729	3.7	6.15	4,475	23.00
Fruits, small	33	Pound	83,630	2,534	.03	2,598	78.70
Garden	185					6,181	33.60
Hay (except above)	1,490	Ton	2,880	1.9	6.00	17,313	11.50
Hops	238	Pound	192,390	808	.22	42,273	177.50
Oats	1,130	Bushel	23,766	21	.40	9,563	8.45
Onions	33	Bushel	3,114	94	.68	2,110	64.00
Pasture	410					8,616	21.00
Peaches	168	Pound	915,835	5,450	.012	10,730	64.00
Pears	75	Pound	105,550	1,410	.024	2,542	33.90
Peas	6	Bushel	117	19.5	1.12	131	21.90
Potatoes, common	3,700	Ton	12,246	2.9	13.50	168,158	45.50
Wheat	345	Bushel	11,165	32.4	.78	8,677	25.20
Less duplicated areas	863						
Total	12,595					422,950	33.60
Irrigated, no crop:							
Young orchard	6,740						
New seeding	1,465						
Fall plowed	545						
Miscellaneous	820						
Less duplicated areas	3,415						
Total	6,155						
Total irrigated	18,750						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	20,630	740
Total irrigated area farms reported	18,750	740
Under water-right applications	18,750	740
Total cropped area farms reported	12,595	682

PUBLIC NOTICE DATED OCTOBER 2, 1913.

In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), notice is hereby given as follows:

1. Water will be furnished from the Sunnyside unit, Yakima project, Washington, under the provisions of the reclamation act beginning in the irrigation season of 1914 for the public-land farm units G to Y, inclusive, excepting I and O, in E. $\frac{1}{2}$ SE. $\frac{1}{4}$, SW. $\frac{1}{4}$ SE. $\frac{1}{4}$, SE. $\frac{1}{4}$ SW. $\frac{1}{4}$, and W. $\frac{1}{2}$ SW. $\frac{1}{4}$, sec. 26, T. 9 N., R. 23 E., Willamette meridian, as shown on plat of the said township approved August 15, 1913, and filed in the local land office at North Yakima, Wash. Copies of the said plat and also of a supplemental list showing the irrigable areas of the said farm units are also on file in the office of the Reclamation Service at Sunnyside, Wash.

2. All persons entitled to preference rights of entry upon lands covered by this public notice will be notified by the local land office by registered mail that they will be allowed to make homestead entry for one farm unit, covered by their preference right under the terms

of the reclamation act and this public notice, within 30 days from the date of such notification. Such homestead entries must be accompanied by applications for water rights, and, as hereinafter provided, by the appropriate payment of the charges for building, operation, and maintenance. Upon rejection of any homestead application under this public notice by the local land officers an appeal to the Commissioner of the General Land Office must be filed in the usual manner, and no motion for rehearing of the departmental decision rendered on such appeal will be considered. The rules of practice are modified accordingly, so far as they relate to cases arising hereunder.

3. The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family on the lands entered subject to the provisions of the reclamation act is fixed at the amounts shown on the plats for the several farm units. Said farm units vary in size from 10.35 to 19.12 acres of irrigable land.

4. A large proportion of the lands comprised in these farm units is above gravity flow from the system of the Sunnyside unit, Yakima project. A private pumping plant has been installed in the vicinity of this land of sufficient capacity to raise the water for irrigation to these lands. Entrymen must, however, assume all responsibility for and bear all expenses of, raising said water from the system of the Sunnyside unit as now constructed to the lands to be irrigated. Such fact shall not, however, affect the charges to be paid to the United States for water right upon said lands.

5. The charges which shall be made per acre of irrigable land in the said entries are in two parts, as follows:

(*a*) The building of the irrigation system, $52 per acre of irrigable land, payable in not more than 10 annual installments, each payment not less than $5.20 or some multiple thereof per acre. Full payment may be made at any time of any balance of the building charge remaining due, subject to the general reclamation regulations approved by the Secretary of the Interior.

(*b*) For operation and maintenance, 95 cents per acre of irrigable land per annum, until further notice, whether water is used thereon or not. As soon as data are available, the operation and maintenance charge will be fixed in proportions to the amount of water used, with minimum charge per acre, whether water is used thereon or not.

6. All entries made under preference rights, as provided in paragraph 2 hereof, and also all homestead entries made under the provisions of the reclamation act, shall be accompanied by applications for water rights in due form, and by the first installment of charges for building, $5.20 per acre of irrigable land, and for operation and maintenance, 95 cents per acre of irrigable land. The second installment of the building charge, not less than $5.20 per acre, and the appropriate charge for operation and maintenance, shall become due on March 1, 1915. Subsequent installments of the charges for building, operation, and maintenance shall become due on March 1 of each year thereafter until fully paid.

7. Homestead entries, accompanied by applications for water rights and, as hereinafter provided, by the appropriate payment of the charges for building, operation, and maintenance, may be made under

the provisions of said act for the farm units covered by this notice for which preference rights of entry have not been exercised under the provisions of paragraph 2 hereof in the manner hereinafter provided.

8. Homestead applications for the farm units shall be made only in the manner following: Any person qualified to make homestead entry may execute such application on and after November 15, 1913, up to and including November 21, 1913, before any duly authorized officer within the land district. Each homestead application must be accompanied by a properly executed water-right application and by a certified check on a national bank or a post-office money order drawn to the order of the special fiscal agent of the United States Reclamation Service at Sunnyside, Wash., for the amount of the first installment of water-right charges for building, operation, and maintenance, viz, $6.15 per acre of irrigable land, and also by a certified check on a national bank or post-office money order drawn to the order of the receiver of the United States land office, North Yakima, Wash., for the amount of fees and commissions, amounting to $6.50 per entry.

9. The homestead application, the water-right application, and the certified checks or money orders, and all other papers necessary to show the applicant to be qualified to make homestead entry, shall be inclosed in a sealed envelope, addressed to the register and receiver of the United States land office at North Yakima, Wash., and the upper left-hand corner of the envelope must contain the name and address of the applicant and the description of the land by farm unit, section, township, and range, and be marked "Sunnyside unit." The papers so prepared and inclosed in a sealed envelope may be filed in person, through another, or through the mail in the United States land office at North Yakima, Wash., on November 21, 1913, between 9 a. m. and 4.30 p. m. All persons sending in their applications by mail should post them at such time as to insure their being received at the local land office between these hours. All applications filed before 9 o'clock a. m. of that day will be returned without opening, and all applications filed after 4.30 o'clock p. m. of that day will be held until all applications filed between 9 o'clock a. m. and 4.30 o'clock p. m. are disposed of, when, if there are any vacant farm units for which delayed applications are filed, they will be considered in the order of their filing.

10. Warning is hereby expressly given that no rights can be obtained by settlement made on the land since the date of its withdrawal under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and prior to the allowance of entry hereunder, nor will any person be allowed to obtain preference right or other advantage through priority in presenting homestead application at the United States land office, or by holding a place in any line formed at that office, nor in any other manner than as herein provided for.

11. Where two or more persons apply for the same farm unit on the date above specified, the right to enter will be determined in the manner hereinafter prescribed, on November 24, 1913, at the United States land office at North Yakima, Wash.

12. No person will be allowed to present application to enter more than one farm unit, which must be specifically and fully described

in the homestead application and water-right application, according to legal subdivision, section, township, and range, and also by farm-unit description in accordance with the approved farm-unit plat for the township. If any person presents application for more than one farm unit, none of his several applications will be considered.

13. It shall be the duty of the register and receiver and the project manager of the Sunnyside reclamation project to arrange all envelopes containing applications presented hereunder in alphabetical order, according to the names of the several applicants shown on the outside thereof, without opening the same. They shall also prepare cards or slips of paper of uniform size, color, and appearance, and the names of the several applicants shall be written, one on each slip of paper, with a description of the farm unit applied for, and such cards representing applications for one particular farm unit shall be assembled together.

14. The right of entry for each farm unit shall be determined in public, and before the right for each farm unit for which more than one person has applied is determined it shall be the duty of the register of the local land office to make public announcement that such right is about to be determined. All cards or slips of paper representing applications to enter such farm unit will then be placed in a box or other receptacle provided for that purpose, and the register of the land office shall publicly announce the name of each applicant at the time the card or slip of paper bearing his name is placed within the receptacle. All cards or slips of paper in the receptacle shall be thoroughly mixed, and one card or slip of paper will then be drawn therefrom by some impartial and disinterested person, designated by the officer in charge, and the right to enter the farm unit will be accorded to the applicant whose name appears on the card or slip so drawn, provided he is duly qualified to make homestead entry, and the envelope containing his application will be immediately opened and the papers examined by the local land office, and, if found to comply with the law and the regulations thereunder, they will be given a serial number, and upon approval of the water-right application by the project manager the homestead application will be allowed by the local land officers, but no receipt will be issued until the certified checks, where such accompanied the application, have been paid. While applicants may be present at the time right of entry is awarded, yet such presence is not necessary, as the application of successful persons will be immediately allowed on the papers already filed and notice at once mailed the successful applicants.

15. The slips of paper bearing the names of the other applicants for the particular farm unit will be retained in the receptacle, and if on examination it shall be found that the applicant whose name is first drawn is not qualified to make a homestead entry, or the papers filed in support thereof are unsatisfactory, the register will thereupon reject his application, assigning reasons therefor, and allow the applicant the usual right of appeal, whereupon a second slip will be drawn from such receptacle in the same manner as the first slip was drawn and the person whose name appears on said second slip shall be

accorded the right to make entry of the unit, if duly qualified and his showing is satisfactory. Such procedure shall be followed until a person is found who is qualified to make homestead entry and has met all requirements. Where a second drawing is necessary and entry is allowed thereon, such entry will be subject to the rights of the party whose application was first drawn, if upon appeal the action of the local land officers in rejecting his application be set aside.

16. When the right to enter all of the farm units applied for has been determined, the envelopes remaining unopened shall each be at once inclosed in an official Government envelope and returned by the local land officers to the persons whose names appear on the outside thereof.

17. In order that every person desiring to execute and present application for any of the farm units may be enabled to do so at the time allowed without causing a rush, warning is hereby given that all such applications should be prepared and executed before some of the officers authorized by law at as early a date as possible after November 15, 1913.

18. After the expiration of the period for entry hereinbefore provided for, all entries made for any of the lands described, whether for lands not heretofore entered or for lands covered by prior entries which have been canceled by relinquishment or otherwise, shall be accompanied by applications for water rights in due form, and by all charges for building, operation, and maintenance then due, except where payments have been duly made by the prior applicants and credits therefor duly assigned in writing. The second installment shall become due on March 1 of the calendar year following the date of entry, and subsequent installments shall become due on March 1 of each year thereafter until fully paid. In the case of entries made in the calendar year 1913 the second installment will become due March 1, 1915. All installments of charges shall become due and payable as herein provided, whether or not water-right application is made therefor or water is used thereon.

19. The regulation is hereby established that no water will be furnished in any year until all operation and maintenance charges then due shall have been paid in full.

20. Failure to pay any two installments of the charges when due, whether on entries made subject to the reclamation act or on water-right applications for other lands, shall render such entries and the corresponding water-right applications, if any, or the water-right applications for other lands, subject to cancellation, with forfeiture of all rights under the reclamation act, as well as of any moneys already paid.

21. All charges are payable to the special fiscal agent of the Reclamation Service at Sunnyside, Wash.

ANDRIEUS A. JONES,
Acting Secretary of the Interior.

ORDER DATED MARCH 10, 1914.

It is hereby ordered that no water shall be delivered to any water user under the Sunnyside unit of the Yakima project pursuant to

any contract with the United States wherein the water user has agreed to subscribe to the stock of the Sunnyside Water Users' Association unless at the time request for such water is made the water user proves himself by certificate of the secretary of said association to be a subscriber to the stock of the said association as contemplated in said contract. This order shall not be construed as prohibiting the delivery of water to which any such water user is recognized as having a vested right prior to the making of contract with the United States, and applies solely to delivery of water supplementing such vested right under contract with the United States.

ANDRIEUS A. JONES,
First Assistant Secretary.

PUBLIC NOTICE DATED APRIL 11, 1914.

Whereas under the provisions of the public notices and orders heretofore issued in pursuance of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, known as the reclamation law, for the Sunnyside unit, Yakima project, Washington, the charges for building, operation, and maintenance have accrued and accumulated against the lands in said unit to such an extent that a considerable portion of the lands thereunder are not being reclaimed and cultivated; and

Whereas it is desirable that the said lands shall be settled at the earliest practicable date by persons who will cultivate, reclaim, and improve the same:

Now, therefore, in pursuance of the provisions of the reclamation law, and in particular of the act of Congress approved February 13, 1911 (36 Stat., 902), public notice is hereby issued as follows:

1. All entries and water-right applications filed in the year 1914 for lands under the Sunnyside unit shall be accompanied by the portions of installments for operation and maintenance which have accrued against the said lands, and the first installment of the building charge, $5.20 per irrigable acre, shall be regarded as due on March 1, 1914. The subsequent installments of the charges for building, and the appropriate charge for operation and maintenance, shall be due on March 1 of each succeeding year until fully paid.

2. Nothing herein contained shall prevent the acceptance by any water user under the Sunnyside unit of the benefits of any legislation now pending before Congress, and which may be hereafter enacted into law, affecting payments to be made on account of the water-right charges.

FRANKLIN K. LANE,
Secretary of the Interior.

PUBLIC NOTICE DATED MARCH 4, 1914.

Whereas under the provisions of the public notices and orders heretofore issued in pursuance of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, known as the reclamation law, for the Tieton unit, Yakima project, Washington, the charges for building, operation, and maintenance have accrued and accumulated against the lands in said unit

to such an extent that a considerable proportion of the lands thereunder are not being reclaimed and cultivated; and

Whereas it is desirable that the said lands shall be settled at the earliest practicable date by persons who will cultivate, reclaim, and improve the same:

Now, therefore, in pursuance of the provisions of the reclamation law, and in particular of the act of Congress approved February 13, 1911 (36 Stat., 902), public notice is hereby issued as follows:

1. All entries and water-right applications filed in the year 1914 for lands under the Tieton unit shall be accompanied by the portions of installments for operation and maintenance which have accrued against the said lands, and the first installment of the building charge, $9.30 per irrigable acre, shall be due on April 1, 1914. The subsequent installments of the charges for building, and the appropriate charge for operation and maintenance, shall be due on April 1 of each succeeding year until fully paid. The building charges shall be graduated as provided for in public notice heretofore issued for the said unit under date of March 21, 1913, provided, however, that no person shall be entitled to make payments in accordance with such schedule of graduated payments until he shall have reclaimed and cultivated at least 50 per cent of the total irrigable area covered by his application.

2. For entrymen and landowners who have heretofore made entries or filed water-right applications which are still intact no installment of the building charge shall become due in 1914, but the installment which under the provisions of the public notices and orders heretofore issued would have become due on April 1, 1914, shall be divided into two parts and added to the ninth and tenth installments, respectively.

3. Nothing herein contained shall prevent the acceptance by any water user under the Tieton unit of the benefits of any legislation now pending before Congress, and which may be hereafter enacted into law, affecting payments to be made on account of the water-right charges.

FRANKLIN K. LANE,
Secretary of the Interior.

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Yakima Storage unit, to June 30, 1914.

ASSETS.

Cash in other employees' hands awaiting transfer to fiscal agent		$1,431.49
Accounts receivable, uncollected miscellaneous items		41,672.20
Inventories:		
Mercantile stores stock on hand	$8,576.18	
Animals	22,242.50	
Mechanical and other equipment	142,249.39	
Material and supplies on hand in storehouses	38,580.41	
Unadjusted transfers between projects	100.57	
Undistributed cost (freight and handling on inventory property)	[1] 3,140.65	
Total		208,608.40

[1] Deduct.

Construction work in process:			
Gross expenditures for construction of project to date			$1,336,136.75
Less revenue earned during construction as follows:			
Rentals of cottages	$8,531.42		
Rentals of grazing lands	51.00		
Rentals of power and light	329.16		
Rentals of irrigation water	14,305.00		
Rentals of telephones	7.60		
Miscellaneous revenues	29,163.80		
Profits on mess houses	20,357.40		
Profits on mercantile stores	6,996.03		
Profits on hospital	955.94		
Adjustments—			
Depreciation on plant and equipment	3,937.77		
Profits shown on Government animals	14,318.37		
Westcott suspended contract costs	32,021.66		
Total deductions		130,975.15	
Net expenditures for construction of project to date			$1,205,161.00
Total assets			1,456,873.69

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		18,111.85	
Unpaid purchases		27,036.58	
Unpaid freight and express charges		8,717.32	
Unpaid passenger fares		164.00	
Unredeemed coupon books		396.20	
Total			54,425.95
Net investment:			
Disbursements	$1,313,252.47		
Transfers received from other projects	144,859.13		
		1,458,111.60	
Less—			
Collections	36,047.64		
Transfers issued to other projects	19,616.22		
		55,663.86	
Total			1,402,447.74
Total liabilities, reserves, and capital investment of the Government			1,456,873.69

Functional feature costs of Yakima Storage project to June 30, 1914.

Development (storage) works:		
Kachess	$601,963.11	
Keechelus	500,262.35	
Clealum	119,501.46	
McAllister Meadows	12,179.82	
Reservoir reconnoissance	2,927.92	
Hydrographic survey	5,287.56	
Hydrographic investigations	19,045.68	
		$1,261,167.90

Telephone lines:		
Kachess	$806.45	
Keechelus	4,665.00	
Clealum	606.79	
		$6,078.24
Roads and bridges:		
Kachess	3,952.90	
Keechelus	10,126.02	
McAllister Meadows	17,044.93	
		31,123.85
Cost ledger inventories:		
Kachess	1,323.57	
Keechelus	36,359.80	
Clealum	83.39	
		37,766.76
Gross expenditures for construction of project to date		1,336,136.75

Assets, liabilities, reserves, and capital, Yakima-Sunnyside unit, to June 30, 1914.

ASSETS.

Cash in other employees' hands awaiting transfer to fiscal agent		$5.00
Accounts receivable:		
Uncollected miscellaneous rentals	$15.00	
Uncollected miscellaneous items	11,911.00	
Construction charges due and uncollected from water-right applicants	225,420.53	
Operation and maintenance charges due and uncollected from water-right applicants	20,752.55	
Total		258,099.08
Inventories:		
Mechanical and other equipment	11,281.51	
Material and supplies on hand in storehouses	9,827.03	
Unadjusted transfers between projects	1,770.00	
Undistributed cost (freight and handling on inventory property)	[1]1,183.44	
Total		21,695.10
Construction work in process:		
Gross expenditures for construction of project to date	2,396,548.25	
Less revenue earned during construction as follows:		
Miscellaneous revenues $404.15		
Profits on mess houses 4,481.74		
Profits on mercantile stores 2,725.61		
Profits on hospitals 640.17		
Contractors' freight refunds 8,886.87		
Forfeitures by defaulting bidders and contractors 5,311.16		
Adjustments—		
Depreciation on plant and equipment 345.32		
Profits shown on Government animals 20,108.65		
Suspended contract costs 13,360.14		
Total deductions	56,263.81	
Net expenditures for construction of project to date		2,340,284.44
Deferred operation and maintenance charges		21,692.38
Total assets		2,641,776.00

[1] Deduct.

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$4,980.69	
Unpaid purchases		1,910.77	
Unpaid freight and express charges		1,962.33	
Unpaid passenger fares		21.00	
Unpaid agreements to purchase real estate		100.00	
Unpaid miscellaneous		716.70	
Total			$9,691.49
Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		816,324.02	
Construction charges paid in advance by water-right applicants		6,663.53	
Total			822,987.55
Net investment:			
Disbursements	$2,881,354.50		
Transfers received from other projects	121,210.86		
		3,002,565.36	
Less—			
Collections	1,124,417.45		
Transfers issued to other projects	69,050.95		
		1,193,468.40	
Total			1,809,096.96
Total liabilities, reserves, and capital investment of the Government			2,641,776.00

Functional feature costs of Yakima-Sunnyside unit to June 30, 1914.

Carriage system	$1,900,345.79
Distribution system	369,534.84
Real estate	24,276.46
Telephone lines	13,848.61
Farm-unit subdivisions	20,888.67
Miscellaneous preliminary investigations	67,598.96
Cost ledger inventories	54.92
Gross expenditures for construction of project to date	2,396,548.25

Operating revenues and expenses, Yakima-Sunnyside unit, to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$275.83
Maintenance	3,080.39
Carriage system:	
Operation	109,944.80
Maintenance	177,156.93
Distribution system:	
Operation	71,316.60
Maintenance	156,059.37
Undistributed expenses:	
Operation	12,162.17
Maintenance	1,808.30
Total	531,804.39

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$462,919.56
Operation and maintenance charges paid in advance by water-right applicants	551.09
Rentals of lands and buildings	905.40
Rentals of power and light	1,989.20
Rentals of irrigation water	36,867.86
Miscellaneous revenues	6,878.90
Deferred operation and maintenance revenues (carried to debit side of assets and liabilities statement)	21,692.38
Total	531,804.39

Assets, liabilities, reserves, and capital, Yakima-Tieton unit, to June 30, 1914.

ASSETS.

Cash:		
In fiscal agent's possession awaiting remittance	$124.75	
In other employees' hands awaiting transfer to fiscal agent	24.45	
Total		$149.20
Accounts receivable:		
Construction charges due and uncollected from water-right applicants	224,675.84	
Operation and maintenance charges due and uncollected from water-right applicants	9,141.75	
Total		233,817.59
Inventories:		
Mercantile stores stock on hand	693.42	
Animals	3,010.00	
Mechanical and other equipment	23,117.41	
Material and supplies on hand in storehouses	6,737.51	
Unadjusted transfers between projects	5,050.01	
Undistributed cost (freight and handling on inventory property)	433.80	
Total		39,042.15
Construction work in process:		
Gross expenditures for construction of project to date	3,065,186.81	
Less revenue earned during construction, as follows—		
Rentals of cottages	$4,295.97	
Rentals of irrigation water	3,526.50	
Losses on mess houses	[1] 682.36	
Profits on mercantile stores	9,466.86	
Profits on hospitals	1,514.44	
Contractors' freight refunds	5,092.12	
Adjustments—		
Depreciation on plant and equipment	212.43	
Profits shown on Government animals	15,541.12	
Weisberger suspended contract cost	1,147.31	
Total deductions	40,114.39	
Net expenditures for construction of project to date		3,025,072.42
Total assets		3,298,081.36

[1] Deduct.

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$6,120.37	
Unpaid purchases		5,819.71	
Unpaid freight and express charges		1,822.39	
Unpaid passenger fares		242.26	
Unredeemed coupon books		22.40	
Total			$14,027.13
Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		412,982.88	
Construction charges paid in advance by water-right applicants		2,020.11	
Total			415,002.99
Net investment:			
Disbursements	$2,968,549.75		
Transfers received from other projects	574,048.29		
		3,542,598.04	
Less—			
Collections	388,000.02		
Transfers issued to other projects	296,350.36		
		684,350.38	
Total			2,858,247.66
Revenues in excess of cost of operation and maintenance			10,803.58
Total liabilities, reserves, and capital investment of the Government			3,298,081.36

Functional feature costs of Yakima-Tieton unit to June 30, 1914.

Development (storage) works	$550,818.85
Carriage system	1,134,663.86
Distribution system	1,171,326.00
Real estate	41,943.95
Telephone lines	25,148.78
Roads and bridges	59,573.55
Miscellaneous preliminary investigations	69,694.56
Operation and maintenance during construction	10,208.54
Cost ledger inventories	1,808.72
Gross expenditures for construction of project to date	3,065,186.81

Operating revenues and expenses, Yakima-Tieton unit, to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$3,726.89
Maintenance	1,270.59
Carriage system:	
Operation	7,300.94
Maintenance	10,602.47
Distribution system:	
Operation	36,286.44
Maintenance	45,337.97
Undistributed expenses:	
Operation	9,150.00
Maintenance	11,048.26
Revenues in excess of cost of operation and maintenance (carried to credit side of assets and liabilities statement)	10,803.58
Total	135,527.14

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	$132,454.04
Operation and maintenance charges paid in advance by water-right applicants	178.50
Operation and maintenance charges paid and forfeited by water-right applicants	3.00
Rentals of lands and buildings	2,794.10
Rentals of irrigation water	97.50
Total	135,527.14

Functional feature costs of Yakima project to June 30, 1914.

[Including the following units: Storage, Sunnyside, Tieton.]

Development (storage) works	$1,811,986.75
Carriage system	3,035,009.65
Distribution system	1,540,860.84
Real estate	66,220.41
Telephone lines	45,075.63
Farm-unit subdivisions	20,888.67
Roads and bridges	90,697.40
Miscellaneous preliminary investigations	137,293.52
Operation and maintenance during construction	10,208.54
Cost ledger inventories	39,630.40
Gross expenditures for construction of project to date	6,797,871.81

Estimated cost of contemplated work on the Storage, Sunnyside, and Tieton units of the Yakima project for fiscal year 1915.

Development (storage) works:		
Kachess Dam and Reservoir	$107,300.00	
Keechelus Dam and Reservoir	493,000.00	
Clealum Dam and Reservoir	16,500.00	
Bumping Lake Dam and Reservoir	21,000.00	
Clear Creek Dam	46,700.00	
McAllister Meadows Dam and Reservoir	12,000.00	
Hydrographic investigations and survey	11,900.00	
		$708,400.00
Carriage system:		
Sunnyside unit—		
Main project	20,600.00	
Benton extension	240,800.00	
Pumping plants	249,600.00	
Tieton unit	1,500.00	
		512,500.00
Distribution system:		
Sunnyside unit—		
Main project	20,900.00	
Pumping plants	157,700.00	
Tieton unit	1,000.00	
		179,600.00
Telephone lines, Storage unit		2,200.00
Farm-unit subdivisions, Sunnyside unit		1,800.00
Roads and bridges, Storage unit		1,700.00
Operation and maintenance under public notice:		
Sunnyside unit	90,000.00	
Tieton unit	45,000.00	
		135,000.00
Total for Yakima project, fiscal year 1915		1,541,200.00

WYOMING, SHOSHONE PROJECT.

G. O. SANFORD, project manager, Powell, Wyo.; C. M. JUMP, superintendent of irrigation.

(For *Results to June 30, 1914*, and *Data for Complete Projects*, see appendix.)

LOCATION.

Counties: Park and Bighorn.

Townships, 52 to 58 N., Rs. 97 to 104 W., sixth principal meridian.

Railroad: Chicago, Burlington & Quincy.

Railroad stations and estimated population January 1, 1914: Cody 1,300, Corbett,[1] Deaver,[1] Ralston,[2] Powell 450, Garland 40, Mantua,[1] and Frannie,[1] Wyo.

WATER SUPPLY.

Source of water supply: Shoshone River.

Area of drainage basin: 1,380 square miles.

Annual run-off in acre-feet of Shoshone River near Cody (1,380 square miles), 1902 to 1913: Maximum, 1,420,000; minimum, 905,000; mean, 1,140,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1914: 41,168 acres.

Area under water-right applications, season of 1914: 25,770 acres.

Area under rental contracts, season of 1914: 157 acres.

Length of irrigating season: From April 20 to October 20—180 days.

Average elevation of irrigable area: 4,500 feet above sea level.

Average annual rainfall on irrigable area: 1907 to 1913, 5.53 inches; 1913, 4.87 inches.

Range of temperature on irrigable area: —31° to 101° F.

Character of soil of irrigable area: Light sandy and clay loams.

Principal products: Alfalfa, grain, vegetables, cattle, and hogs.

Principal markets: Omaha, Nebr.; Kansas City, Mo.; Chicago, Ill.; Billings, Mont.; and local.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto: November 25, 1907; April 3, 1908; May 8, 1909; February 6, March 25, May 20, November 8, 1911; February 9, March 23, July 17, 1912; January 17, February 26, June 23, July 15, July 21, 1913; January 19, May 29, 1914 (memorandum).

Location of lands opened: Tps. 54 to 56 N., Rs. 98 to 100 W., sixth principal meridian.

Present status of irrigable lands opened: 25,260 acres of public and 530 acres of private land under water-right application, 12,955 acres of unentered public land, and 2,102 acres of private and State land open to entry for which water is available, but for which no water-right application has been made; 321 acres of land included in United States reserves.

Limit of area of farm units: Public, 80 acres; private, 160.

Duty of water: 2 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $50 on first unit, $51 on second, and $52 on third and fourth.

Annual operation and maintenance charge: $1 per acre of irrigable land.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1903.

Construction recommended by Board of Engineers February 1, 1904.

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[1] Railroad sidings only.

[2] Population less than 25.

Construction authorized by Secretary February 10, 1904.
Corbett diversion dam completed June, 1907.
Corbett Tunnel completed November, 1907.
First irrigation by Reclamation Service, season of 1908.
Shoshone Dam completed January, 1910.
Entire project 50 per cent completed June 30, 1914; first, second, third, and fourth units completed.

IRRIGATION PLAN.

The irrigation plan of the Shoshone project provides for the storage of flood waters of Shoshone River in a reservoir controlled by Shoshone Dam, about 8 miles above Cody, Wyo.; the diversion of water from Shoshone River by a dam at Corbett, about 16 miles below the reservoir, and through the Corbett Tunnel into a canal system supplying water to lands on the north side of the river in the vicinity of Ralston, Powell, Garland, Mantua, and Frannie; the diversion into the Willwood Canal for the irrigation of lands on the south side of the Shoshone River; and the diversion into the north side High Line from the Shoshone Dam for the irrigation of lands lying on the north side of the Shoshone River above the Garland Canal system and extending from the lower end of the Shoshone Canyon near Cody to the divide between the Shoshone River and Clarks Fork drainage.

The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The Shoshone Dam, Corbett Dam, Corbett Tunnel, Garland Canal, about 12 miles of the Frannie Canal, and the lateral and distributary system for approximately 42,000 acres in the vicinity of Ralston, Powell, and Garland, Wyo., have been completed.

Future operations include the contruction of the High Line Canal, the Willwood Canal, and the extension of the Frannie Canal to cover lands in the vicinity of Frannie, Wyo.

CONSTRUCTION DURING FISCAL YEAR.

Alkali Creek inclined drop.—In crossing the valley of Alkali Creek, Garland Canal drops 52.2 feet in a distance of 2,328 feet. For the past six years a wooden flume with a capacity of about 280 second-feet has been used to carry the water down this incline. This structure has reached its limit, both as to capacity and safety, and is being replaced by a concrete-lined canal 2,035 feet long and a 293-foot metal flume supported on a timber trestle. The maximum capacity is 850 second-feet. The plans for this work contemplate the excavation of about 8,000 cubic yards of earth and the placing of about 800 cubic yards of reinforced concrete, 125 cubic yards of riprap, and 19,000 feet, board measure, of lumber. Work was started during the latter part of March and the structure was 90 per cent completed on June 30, 1914. A temporary connection at the upper end makes it available about July 1 for supplementing the quantity of water carried through the old wooden flume, which will remain in commission throughout the season of 1914. It is proposed to finish the new inclined drop at the close of the irrigation season.

DRAINAGE.

The investigation of water logged and seeped lands and the construction of drainage works for their relief was continued throughout the year. During the latter half of 1913 there were engaged on the work two drag-line excavators and one Austin trenching machine. In the spring of 1914 work was resumed with one drag-line excavator and one trenching machine and continued until the end

of the year. All of the drains constructed, with the exception of open outlets, were of the closed type, the pipe used ranging from 10 to 18 inches in diameter. During the year there were constructed 72,860 feet of tile drains, making a total on the project up to that date of 158,205 linear feet.

The result of the drainage works has been a general lowering of the water table over the area tributary to them. This lowering has varied in different localities from 2 to 6 feet. The soils of the project are underlain at depths varying roughly from 2 to 4 feet with porous sand and gravel. This gravel subsoil readily absorbs any underground waste of irrigation or losses from canals, and continues to fill until water is brought up and on the lower area gradually forced through the more or less impervious top soils to the surface. The object of drainage works has been to carry away the excess waters which find their way into the gravel subsoils and prevent the general rise of the ground-water table to a sufficient height to interfere with the surface soils. To this end drains have been placed at depths ranging roughly from 8 to 10 feet below the surface. All of the drains so far constructed have worked well and practically no difficulty has been experienced in their maintenance.

At the end of the irrigation season of 1913 and the beginning of 1914 the water table had been drawn down over that portion of the project tributary to drains, so that with the exception of a few small areas the land seemed safe from further water-logging. During the first part of the irrigation season of 1914 the excessive quantities of water which were applied to portions of the lands resulted in a large amount of underground waste which in places filled up the subsoils and raised the water table to near the surface of the ground. This was despite the fact that all of the drains were working to their full capacity. Measurements show that for the year 1914 up to June 30 the quantity of water discharged by the drains was 40 per cent of the total quantity of water delivered to farmers on the tributary area.

In order to prevent such a rise in the ground water during the irrigation season it will be necessary to reduce the amount of water applied to the lands or to construct additional drains sufficient to carry away excessive quantities of unnecessary waste. The amount of additional drains that will be required depends practically upon the amount of water applied to the lands and the consequent underground waste resulting therefrom.

Authority has been secured for the construction of about 40,000 feet of tile drain and 3,000 feet of open outlet, and also for the deepening of the channel of Bitter Creek for a distance of 12,000 feet. This work is for the reclamation and protection of some areas which have not yet been reached by drains.

The following statement shows the extent of the area affected by seepage in 1910, 1911, 1913, and 1914:

Item.	1910	1911	1912	1913	1914[1]
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Area so wet as to be too wet to cultivate	255	874	2,014	1,973	1,200
Area so affected as to materially reduce crop yields	87	655	1,316	878	870
Number of farm units affected	29	111	180	174	170

[1] To June 30, 1914.

From a study of the ground-water plane it is estimated that approximately 8,600 acres have been protected and reclaimed by drains already constructed.

OPERATION AND MAINTENANCE.

During the season of 1914 Shoshone Dam, Corbett diversion dam, the main supply (Garland) canal, 10 main laterals, and 83 sublaterals, aggregating 245 miles of canal, were operated. No serious difficulties were experienced in successfully operating the system and delivering a continuous supply of water to the irrigable lands, although constant vigilance is required to maintain a high standard of efficiency. In July, 1913, and in May and June, 1914, it became necessary to limit the quantity of water delivered to 1 second-foot for each 40-acre unit and 1½ second-feet for each 80-acre unit, this restriction being necessary when the combined maximum capacity of Alkali Creek flume and lateral A was reached. The quantity of water delivered to the irrigable lands was materially in excess of 1 second-foot for each 70 acres of irrigable land, which is the limitation prescribed by the Wyoming statutes. The question of delivery of water by rotation was given consideration in public meetings in March and April, 1914, and the advantages of such a system pointed out to the water users. The water users were rather evenly divided on the question, but a majority decided to continue the method heretofore used, namely, delivery of water as requested. The discussion of rotation has resulted in a general demand for larger irrigating heads, but in too many cases there has been an excessive waste of water.

Historical review, Shoshone project.

Item.	1909	1910	1911	1912	1913	1914 [1]
Acreage for which service is prepared to supply water	30,898	30,898	34,898	41,332	41,309	41,168
Acreage irrigated	9,025	14,701	16,216	16,524	19,423	22,111
Number of farms irrigated	167	275	322	346	396	420
Miles of canal operated	90	110	210	242	242	245
Water diverted (acre-feet)	36,257	48,241	54,862	50,100	69,767	34,000
Water delivered to land (acre-feet)	22,973	30,351	35,787	27,370	40,436	18,712
Per acre of land irrigated (acre-feet)	2.54	2.05	2.20	1.66	2.081	0.85

[1] To June 30, 1914.

SETTLEMENT.

During the fiscal year three town lots in the town of Powell were sold, returning to the reclamation fund $850, and bringing the total returns to the fund on account of town-lot sales to $31,915 on June 30, 1914. On May 28, 1914, approval was received for the appraisal and public sale of additional lots, and also the reappraisal of any unsold lots which have previously been placed upon the market. Recommendations have been made setting aside block 32 for a public park, and lots 13, 14, 15, and 16, block 29, for library purposes. Arrangements have been made to hold the sale of lots on July 10, 1914.

During the fiscal year there has been a net increase of 27 filings, and progress along this line has been fair. A large number of inquiries have been received from prospective settlers who are waiting for the reclamation extension bill to become a law. It is expected that if this act is passed there will be an immediate increase in the number of entries. During the present irrigating season it is ex-

pected to complete an 8-mile extension to lateral A, which will add about 3,000 acres to the irrigable area. This will place upon the market a number of excellent farm units, and it is known that friends and relatives of present settlers are waiting for this new unit to be opened.

Settlement data, Shoshone project.

Item.	1912	1913	1914
1. Total number of farms on project	612	615	616
2. Population of (1)	[1] 1,700	1,279	[1] 1,400
3. Number of irrigated farms	360	396	424
4. Operated by owners or managers	.....	349	359
5. Operated by tenants	.....	47	65
6. Population of (3)	[1] 1,700	1,279	[1] 1,400
7. Number of towns	3	3	3
8. Population of (7)	[1] 500	515	[1] 525
9. Total population in towns and on farms (sum of 2 and 8)	[1] 2,200	1,794	[1] 1,925
10. Number of public schools	6	6	6
11. Number of churches	6	6	6
12. Number of banks	3	3	3
13. Total capital stock	$60,000	$60,000	$60,000
14. Total amount of deposits	$125,000	$146,000	$156,664
15. Total number of depositors	800	850	1,037
16. Number of relinquishments	34	16	14
17. Number of cancellations	0	10	0

[1] Estimated.

PRINCIPAL CROPS.

During the season of 1913, 19,423 acres were irrigated, of which 18,178 acres were cropped, the gross return therefrom amounting to $262,464.05, or an average of $14.44 per acre. Alfalfa continues to be the leading crop. The acreage sown to alfalfa in 1913 was 3,155 acres in excess of that cultivated in 1912, while the average yield jumped from 1.66 tons in 1912 to 2.31 tons in 1913.

The gross value of crops produced during 1913 was $107,064 above that of 1912. The present indications are that the crop production for 1914 will exceed any previous year. The first cutting of alfalfa, however, will be lighter than that of 1913, many farmers reporting that a portion of their alfalfa was killed during the winter on account of being too dry. About 150 acres of old alfalfa land have been planted to sugar beets, and present indications point to a good crop. This is the first year that sugar beets have been produced for sale to the beet-sugar factory in Billings, Mont. This crop will materially add to the gross return per acre of the cultivated lands.

Crop report, Shoshone project, year of 1913.

Crop.	Area (acres.)	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:							
Alfalfa	10,945	Ton	25,288	2.31	$6.50	$164,372	$15.02
Alfalfa seed	151	Bushel	174½	1.16	12.00	2,094	13.87
Barley	313	Bushel	5,646	18.01	.80	4,517	14.41
Beans	5	Bushel	6	1.33	3.00	18	4.00
Beets, sugar	9	Ton	71	7.68	5.50	391	42.22
Cane	6	Ton	3	.50	6.00	18	3.00
Clover hay	33	Ton	10	.30	5.00	50	1.52
Clover seed	15	Bushel	60	4.00	12.00	720	48.00
Corn, Indian	7	Bushel	85	11.33	.50	43	5.67
Corn fodder	3	Ton	5	1.43	6.50	32	9.29
Garden	239	.....	.....	.....	.....	8,600	35.95

Crop report, Shoshone project, year of 1913—Continued.

Crop.	Area (acres.)	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Cropped:—Continued							
Hay, except above	200	Ton	166	0.83	$6.50	$1,079	$5.38
Oats	3,211	Bushel	84,585	26.35	.50	42,292	13.17
Onions	1	Bushel	36	72.00	1.70	61	122.40
Pasture	382					4,355	11.41
Peas	1	Bushel	20	13.33	3.00	60	40.00
Potatoes, common	168	Bushel	11,461½	68.32	.50	5,731	34.16
Wheat	2,488	Bushel	35,038½	14.08	.80	28,031	11.27
Total	18,178					262,464	14.44
Irrigated no crop:							
Orchard	101						
New alfalfa	2,598						
Ground fall plowed	76						
Miscellaneous	31						
Less duplicated areas	1,561						
Total	1,245						
Total irrigated	19,423						

Areas.	Acres.	Number of farms.
Total irrigable area farms reported	23,065.95	396
Total irrigated area farms reported	19,422.75	396
Under water-right applications	19,281.75	391
Under rental contracts	141.00	5
Total cropped area farms reported	18,178.00	396

FINANCIAL STATEMENTS.

Assets, liabilities, reserves, and capital, Shoshone project, to June 30, 1914.

ASSETS.

Accounts receivable:		
Uncollected freight refunds	$7,009.83	
Uncollected miscellaneous items	3,627.90	
Construction charges due and uncollected from water-right applicants	124,588.55	
Operation and maintenance charges due and uncollected from water-right applicants	342.85	
Total		$135,569.13
Inventories:		
Mercantile stores stock on hand	558.29	
Animals	3,860.74	
Mechanical and other equipment	46,346.61	
Material and supplies on hand in storehouses	43,552.32	
Goods in transit	58.20	
Undistributed cost (freight and handling on inventory property)	[1] 3,520.22	
Total		90,855.94
Construction work in process:		
Gross expenditures for construction of project to date	3,807,847.30	
Less revenue earned during construction, as follows:		
Rentals of cottages $7,743.80		
Rentals of grazing land 326.00		
Rentals of tents 397.40		
Rentals of telephones 118.85		

Construction work in process—Continued.			
Less revenue earned during construction, as follows—Continued.			
Miscellaneous revenues	$867.67		
Loss on mess houses	[1] 10,327.24		
Profits on mercantile stores	2,981.49		
Profits on hospitals	1,321.31		
Receipts from sale of town sites	27,881.68		
Contractor's freight refunds	19,355.59		
Forfeitures by defaulting bidders and contractors	45,621.19		
Adjustments—			
Depreciation on plant and equipment	9,292.20		
Profits shown on Government animals	941.19		
Total deductions		$106,521.13	
Net expenditures for construction of project to date			$3,701,326.17
Deferred operation and maintenance charges			363,620.08
Total assets			4,291,371.32

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		$5,800.96	
Unpaid purchases		1,709.11	
Unpaid freight and express charges		7,478.12	
Unpaid miscellaneous		10,567.31	
Unpaid passenger fares		131.05	
Total			25,686.55
Reserves for repayment to reclamation fund of cost of project:			
Construction charges accrued on contracts with water-right applicants		330,033.27	
Construction charges paid in advance by water-right applicants		1,729.66	
Construction charges paid and forfeited by water-right applicants		2,101.94	
Total			333,864.87
Net investment:			
Disbursements	$4,285,328.42		
Transfers received from other projects	150,617.07		
		4,435,945.49	
Less—			
Collections	455,611.72		
Transfers issued to other projects	48,513.87		
		504,125.59	
Total			3,931,819.90
Total liabilities, reserves, and capital investment of the Government			4,291,371.32

Functional feature costs of Shoshone project to June 30, 1914.

Development (storage) works	$1,217,622.96
Carriage system	2,104,353.44
Distribution system	139,433.23
Drainage and flood protection system	10,199.61

[1] Deduct.

Real estate	$31,220.48
Telephone lines	4,646.06
Farm unit subdivisions	12,933.77
Roads and bridges	152,542.38
Miscellaneous preliminary investigations	132,562.19
Cost ledger inventories	2,333.18
Gross expenditures for construction of project to date	3,807,847.30

Operating revenues and expenses Shoshone project to June 30, 1914.

EXPENSES.

Development (storage) works:	
Operation	$9,717.47
Maintenance	8,110.35
Carriage system:	
Operation	19,533.29
Maintenance	16,551.10
Distribution system:	
Operation	33,957.01
Maintenance	23,958.72
Drainage and flood protection system:	
Operation	891.27
Maintenance	2,795.42
Undistributed expenses, maintenance	340,510.62
Total	456,025.25

REVENUES.

Operation and maintenance charges accrued on contracts with water-right applicants	90,062.77
Operation and maintenance charges paid in advance by water-right applicants	503.92
Operation and maintenance charges paid and forfeited by water-right applicants	1,480.61
Rentals of irrigation water	357.87
Deferred operation and maintenance revenues (carried to debit side of assets and liabilities statement)	363,620.08
Total	456,025.25

Estimated cost of contemplated work, Shoshone project, during fiscal year 1915.

Development (storage) works:		
Damages to land by silt	$80,000.00	
Balanced gates, lower outlet tunnel	50,000.00	
Damages to land, Kane, Wyo	8,000.00	
Total		$138,000.00
Carriage system:		
Lateral A extension	40,000.00	
Frannie Canal extension and Willwood Canal	75,000.00	
Total		115,000.00
Distribution system:		
Frannie Canal extension and Willwood Canal		25,000.00
Telephone lines:		
On Garland division	2,000.00	
On Frannie and Willwood divisions	4,000.00	
Total		6,000.00
Farm unit subdivision, Garland division		2,000.00
Roads and bridges, Frannie and Willwood divisions		5,000.00
Miscellaneous preliminary investigations, stream gauging		100.00
Operation and maintenance during construction		10,000.00
Operation and maintenance under public notice		140,000.00
Total		441,100.00

APPENDIX.

LEGISLATION.

RECLAMATION ACT.

An Act Appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all moneys received from the sale and disposal of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming, beginning with the fiscal year ending June 30, 1901, including the surplus of fees and commissions in excess of allowances to registers and receivers, and excepting the 5 per cent of the proceeds of the sales of public lands in the above States set aside by law for educational and other purposes, shall be, and the same are hereby, reserved, set aside, and appropriated as a special fund in the Treasury to be known as the "reclamation fund," to be used in the examination and survey for and the construction and maintenance of irrigation works for the storage, diversion, and development of waters for the reclamation of arid and semiarid lands in the said States and Territories, and for the payment of all other expenditures provided for in this act: *Provided*, That in case the receipts from the sale and disposal of public lands other than those realized from the sale and disposal of lands referred to in this section are insufficient to meet the requirements for the support of agricultural colleges in the several States and Territories, under the act of August 30, 1890, entitled "An act to apply a portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agricultural and the mechanic arts, established under the provisions of an act of Congress approved July 2, 1862," the deficiency, if any, in the sum necessary for the support of the said colleges shall be provided for from any moneys in the Treasury not otherwise appropriated.

SEC. 2. That the Secretary of the Interior is hereby authorized and directed to make examinations and surveys for, and to locate and construct, as herein provided, irrigation works for the storage, diversion, and development of waters, including artesian wells, and to report to Congress at the beginning of each regular session as to the results of such examinations and surveys, giving estimates of cost of all contemplated works, the quantity and location of the lands which can be irrigated therefrom, and all facts relative to the practicability

of each irrigation project; also the cost of works in process of construction as well as of those which have been completed.

SEC. 3. That the Secretary of the Interior shall, before giving the public notice provided for in section 4 of this act, withdraw from public entry the lands required for any irrigation works contemplated under the provisions of this act, and shall restore to public entry any of the lands so withdrawn when, in his judgment, such lands are not required for the purposes of this act; and the Secretary of the Interior is hereby authorized, at or immediately prior to the time of beginning the surveys for any contemplated irrigation works, to withdraw from entry, except under the homestead laws, any public lands believed to be susceptible of irrigation from said works: *Provided*, That all lands entered and entries made under the homestead laws within areas so withdrawn during such withdrawal shall be subject to all the provisions, limitations, charges, terms, and conditions of this act; that said surveys shall be prosecuted diligently to completion, and upon the completion thereof, and of the necessary maps, plans, and estimates of cost, the Secretary of the Interior shall determine whether or not said project is practicable and advisable, and if determined to be impracticable or unadvisable he shall thereupon restore said lands to entry; that public lands which it is proposed to irrigate by means of any contemplated works shall be subject to entry only under the provisions of the homestead laws in tracts of not less than 40 nor more than 160 acres, and shall be subject to the limitations, charges, terms, and conditions herein provided: *Provided*, That the commutation provisions of the homestead laws shall not apply to entries made under this act.

SEC. 4. That upon the determination by the Secretary of the Interior that any irrigation project is practicable, he may cause to be let contracts for the construction of the same, in such portions or sections as it may be practicable to construct and complete as parts of the whole project, providing the necessary funds for such portions or sections are available in the reclamation fund, and thereupon he shall give public notice of the lands irrigable under such project, and limit of area per entry, which limit shall represent the acreage which, in the opinion of the Secretary, may be reasonably required for the support of a family upon the lands in question; also of the charges which shall be made per acre upon the said entries, and upon lands in private ownership which may be irrigated by the waters of the said irrigation project, and the number of annual installments, not exceeding 10, in which such charges shall be paid and the time when such payments shall commence. The said charges shall be determined with a view of returning to the reclamation fund the estimated cost of construction of the project, and shall be apportioned equitably: *Provided*, That in all construction work eight hours shall constitute a day's work, and no Mongolian labor shall be employed thereon.

SEC. 5. That the entryman upon lands to be irrigated by such works shall, in addition to compliance with the homestead laws, reclaim at least one-half of the total irrigable area of his entry for agricultural purposes, and before receiving patent for the lands covered by his entry shall pay to the Government the charges apportioned against such tract, as provided in section four. No right to the use of water for land in private ownership shall be sold for a tract

exceeding 160 acres to any one landowner, and no such sale shall be made to any landowner unless he be an actual bona fide resident on such land, or occupant thereof residing in the neighborhood of said land, and no such right shall permanently attach until all payments therefor are made. The annual installments shall be paid to the receiver of the local land office of the district in which the land is situated, and a failure to make any two payments when due shall render the entry subject to cancellation, with the forfeiture of all rights under this act, as well as of any moneys already paid thereon. All moneys received from the above sources shall be paid into the reclamation fund. Registers and receivers shall be allowed the usual commissions on all moneys paid for lands entered under this act.

SEC. 6. That the Secretary of the Interior is hereby authorized and directed to use the reclamation fund for the operation and maintenance of all reservoirs and irrigation works constructed under the provisions of this act: *Provided*, That when the payments required by this act are made for the major portion of the lands irrigated from the waters of any of the works herein provided for, then the management and operation of such irrigation works shall pass to the owners of the lands irrigated thereby, to be maintained at their expense under such form of organization and under such rules and regulations as may be acceptable to the Secretary of the Interior: *Provided*, That the title to and the management and operation of the reservoirs and the works necessary for their protection and operation shall remain in the Government until otherwise provided by Congress.

SEC. 7. That where in carrying out the provisions of this act it becomes necessary to acquire any rights or property, the Secretary of the Interior is hereby authorized to acquire the same for the United States by purchase or by condemnation under judicial process, and to pay from the reclamation fund the sums which may be needed for that purpose, and it shall be the duty of the Attorney General of the United States upon every application of the Secretary of the Interior, under this act, to cause proceedings to be commenced for condemnation within thirty days from the receipt of the application at the Department of Justice.

SEC. 8. That nothing in this act shall be construed as affecting or intended to affect or to in any way interfere with the laws of any State or Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this act, shall proceed in conformity with such laws, and nothing herein shall in any way affect any right of any State or of the Federal Government or of any landowner, appropriator, or user of water in, to, or from any interstate stream or the waters thereof: *Provided*, That the right to the use of water acquired under the provisions of this act shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right.

SEC. 9.[1] That it is hereby declared to be the duty of the Secretary of the Interior in carrying out the provisions of this act, so far as the same may be practicable and subject to the existence of feasible irrigation projects, to expend the major portion of the funds arising

[1] Sec. 9 of this act repealed by the act of June 25, 1910.

from the sale of public lands within each State and Territory hereinbefore named for the benefit of arid and semiarid lands within the limits of such State or Territory: *Provided*, That the Secretary may temporarily use such portion of said funds for the benefit of arid or semiarid lands in any particular State or Territory hereinbefore named as he may deem advisable, but when so used the excess shall be restored to the fund as soon as practicable, to the end that ultimately, and in any event within each ten-year period after the passage of this act, the expenditures for the benefit of the said States and Territories shall be equalized according to the proportions and subject to the conditions as to practicability and feasibility aforesaid.

SEC. 10. That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this act into full force and effect.

Approved, June 17, 1902 (32 Stat., 388).

EXTENDING PERIOD OF PAYMENT.

An Act Extending the period of payment under reclamation projects, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person whose lands hereafter become subject to the terms and conditions of the act approved June seventeenth, nineteen hundred and two, entitled "An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," and acts amendatory thereof or supplementary thereto, hereafter to be referred to as the reclamation law, and any person who hereafter makes entry thereunder shall at the time of making water-right application or entry, as the case may be, pay into the reclamation fund five per centum of the construction charge fixed for his land as an initial installment, and shall pay the balance of said charge in fifteen annual installments, the first five of which shall each be five per centum of the construction charge, and the remainder shall each be seven per centum until the whole amount shall have been paid. The first of the annual installments shall become due and payable on December first of the fifth calendar year after the initial installment: *Provided*, That any water-right applicant or entryman may, if he so elects, pay the whole or any part of the construction charges owing by him within any shorter period: *Provided further*, That entry may be made whenever water is available, as announced by the Secretary of the Interior, and the initial payment be made when the charge per acre is established.

ACT SHALL APPLY TO EXISTING PROJECTS.

SEC. 2. That any person whose land or entry has heretofore become subject to the terms and conditions of the reclamation law shall pay the construction charge, or the portion of the construction charge remaining unpaid, in twenty annual installments, the first of which shall become due and payable on December first of the year in which the public notice affecting his land is issued under this act, and sub-

sequent installments on December first of each year thereafter. The first four of such installments shall each be two per centum, the next two installments shall each be four per centum, and the next fourteen each six per centum of the total construction charge, or the portion of the construction charge unpaid at the beginning of such installments.

PENALTIES.

SEC. 3. That if any water-right applicant or entryman shall fail to pay any installment of his construction charges when due, there shall be added to the amount unpaid a penalty of one per centum thereof, and there shall be added a like penalty of one per centum of the amount unpaid on the first day of each month thereafter so long as such default shall continue. If any such applicant or entryman shall be one year in default in the payment of any installment of the construction charges and penalties, or any part thereof, his water-right application, and if he be a homestead entryman his entry also, shall be subject to cancellation, and all payments made by him forfeited to the reclamation fund, but no homestead entry shall be subject to contest because of such default: *Provided*, That if the Secretary of the Interior shall so elect, he may cause suit or action to be brought for the recovery of the amount in default and penalties; but if suit or action be brought, the right to declare a cancellation and forfeiture shall be suspended pending such suit or action.

INCREASE OF CHARGES.

SEC. 4. That no increase in the construction charges shall hereafter be made, after the same have been fixed by public notice, except by agreement between the Secretary of the Interior and a majority of the water-right applicants and entrymen to be affected by such increase, whereupon all water-right applicants and entrymen in the area proposed to be affected by the increased charge shall become subject thereto. Such increased charge shall be added to the construction charge and payment thereof distributed over the remaining unpaid installments of construction charges: *Provided*, That the Secretary of the Interior, in his discretion, may agree that such increased construction charge shall be paid in additional annual installments, each of which shall be at least equal to the amount of the largest installment as fixed for the project by the public notice theretofore issued. And such additional installments of the increased construction charge, as so agreed upon, shall become due and payable on December first of each year subsequent to the year when the final installment of the construction charge under such public notice is due and payable: *Provided further*, That all such increased construction charges shall be subject to the same conditions, penalties, and suit or action as provided in section three of this act.

OPERATION AND MAINTENANCE.

SEC. 5. That in addition to the construction charge, every water-right applicant, entryman, or landowner under or upon a reclamation project shall also pay, whenever water service is available for the irrigation of his land, an operation and maintenance charge

based upon the total cost of operation and maintenance of the project, or each separate unit thereof, and such charge shall be made for each acre-foot of water delivered; but each acre of irrigable land, whether irrigated or not, shall be charged with a minimum operation and maintenance charge based upon the charge for delivery of not less than one acre-foot of water: *Provided*, That, whenever any legally organized water users' association or irrigation district shall so request, the Secretary of the Interior is hereby authorized, in his discretion, to transfer to such water users' association or irrigation district the care, operation, and maintenance of all or any part of the project works, subject to such rules and regulations as he may prescribe. If the total amount of operation and maintenance charges and penalties collected for any one irrigation season on any project shall exceed the cost of operation and maintenance of the project during that irrigation season, the balance shall be applied to a reduction of the charge on the project for the next irrigation season, and any deficit incurred may likewise be added to the charge for the next irrigation season.

PENALTIES.

SEC. 6. That all operation and maintenance charges shall become due and payable on the date fixed for each project by the Secretary of the Interior, and if such charge is paid on or before the date when due there shall be a discount of five per centum of such charge; but if such charge is unpaid on the first day of the third calendar month thereafter, a penalty of one per centum of the amount unpaid shall be added thereto, and thereafter an additional penalty of one per centum of the amount unpaid shall be added on the first day of each calendar month if such charge and penalties shall remain unpaid, and no water shall be delivered to the lands of any water-right applicant or entryman who shall be in arrears for more than one calendar year for the payment of any charge for operation and maintenance, or any annual construction charge and penalties. If any water-right applicant or entryman shall be one year in arrears in the payment of any charge for operation and maintenance and penalties, or any part thereof, his water-right application, and if he be a homestead entryman his entry also, shall be subject to cancellation, and all payments made by him forfeited to the reclamation fund, but no homestead entry shall be subject to contest because of such arrears. In the discretion of the Secretary of the Interior suit or action may be brought for the amounts in default and penalties in like manner as provided in section three of this act.

FISCAL AGENT.

SEC. 7. That the Secretary of the Interior is hereby authorized, in his discretion, to designate and appoint, under such rules and regulations as he may prescribe, the legally organized water users' association or irrigation district, under any reclamation project, as the fiscal agent of the United States to collect the annual payments on the construction charge of the project and the annual charges for operation and maintenance and all penalties: *Provided*, That no water-right applicant or entryman shall be entitled to credit for any payment thus made until the same shall have been paid over to an

officer designated by the Secretary of the Interior to receive the same.

RECLAMATION REQUIREMENTS.

SEC. 8. That the Secretary of the Interior is hereby authorized to make general rules and regulations governing the use of water in the irrigation of the lands within any project, and may require the reclamation for agricultural purposes and the cultivation of one-fourth the irrigable area under each water-right application or entry within three full irrigation seasons after the filing of water-right application or entry, and the reclamation for agricultural purposes and the cultivation of one-half the irrigable area within five full irrigation seasons after the filing of the water-right application or entry, and shall provide for continued compliance with such requirements. Failure on the part of any water-right applicant or entryman to comply with such requirements shall render his application or entry subject to cancellation.

LANDS NOT SUBJECT TO RECLAMATION ACT.

SEC. 9. That in all cases where application for water right for lands in private ownership or lands held under entries not subject to the reclamation law shall not be made within one year after the passage of this act, or within one year after notice issued in pursuance of section four of the reclamation act, in cases where such notice has not heretofore been issued, the construction charges for such land shall be increased five per centum each year until such application is made and an initial installment is paid.

WITHDRAWN LANDS SUBJECT TO ENTRY.

SEC. 10. That the act of Congress approved February eighteenth, nineteen hundred and eleven, entitled "An act to amend section five of the act of Congress of June twenty-fifth, nineteen hundred and ten, entitled 'An act to authorize advances to the reclamation fund and for the issuance and disposal of certificates of indebtedness in reimbursement therefor, and for other purposes,'" be, and the same hereby is, amended so as to read as follows:

"SEC. 5. That no entry shall be hereafter made and no entryman shall be permitted to go upon lands reserved for irrigation purposes until the Secretary of the Interior shall have established the unit of acreage per entry, and water is ready to be delivered for the land in such unit or some part thereof and such fact has been announced by the Secretary of the Interior: *Provided*, That where entries made prior to June twenty-fifth, nineteen hundred and ten, have been or may be relinquished, in whole or in part, the lands so relinquished shall be subject to settlement and entry under the reclamation law."

WATER SERVICE.

SEC. 11. That whenever water is available and it is impracticable to apportion operation and maintenance charges as provided in section five of this act, the Secretary of the Interior may, prior to giving

public notice of the construction charge per acre upon land under any project, furnish water to any entryman or private landowner thereunder until such notice is given, making a reasonable charge therefor, and such charges shall be subject to the same penalties and to the provisions for cancellation and collection as herein provided for other operation and maintenance charges.

ADMISSION OF PRIVATE LANDOWNERS TO NEW PROJECTS.

SEC. 12. That before any contract is let or work begun for the construction of any reclamation project hereafter adopted the Secretary of the Interior shall require the owners of private lands thereunder to agree to dispose of all lands in excess of the area which he shall deem sufficient for the support of a family upon the land in question, upon such terms and at not to exceed such price as the Secretary of the Interior may designate; and if any landowner shall refuse to agree to the requirements fixed by the Secretary of the Interior, his land shall not be included within the project if adopted for construction.

DISPOSITION OF EXCESS FARM UNITS.

SEC. 13. That all entries under reclamation projects containing more than one farm unit shall be reduced in area and conformed to a single farm unit within two years after making proof of residence, improvement, and cultivation, or within two years after the issuance of a farm-unit plat for the project, if the same issues subsequent to the making of such proof: *Provided*, That such proof is made within four years from the date as announced by the Secretary of the Interior that water is available for delivery for the land. Any entryman failing within the period herein provided to dispose of the excess of his entry above one farm unit, in the manner provided by law, and to conform his entry to a single farm unit shall render his entry subject to cancellation as to the excess above one farm unit: *Provided*, That upon compliance with the provisions of law such entryman shall be entitled to receive a patent for that part of his entry which conforms to one farm unit as established for the project: *Provided further*, That no person shall hold by assignment more than one farm unit prior to final payment of all charges for all the land held by him subject to the reclamation law, except operation and maintenance charges not then due.

ACCEPTANCE OF THIS ACT.

SEC. 14. That any person whose land or entry has heretofore become subject to the reclamation law, who desires to secure the benefits of the extension of the period of payments provided by this act, shall, within six months after the issuance of the first public notice hereunder affecting his land or entry, notify the Secretary of the Interior, in the manner to be prescribed by said Secretary, of his acceptance of all of the terms and conditions of this act, and thereafter his lands or entry shall be subject to all of the provisions of this act.

SEC. 15. That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this act into full force and effect.

SEC. 16. That from and after July first, nineteen hundred and fifteen, expenditures shall not be made for carrying out the purposes of the reclamation law except out of appropriations made annually by Congress therefor, and the Secretary of the Interior shall, for the fiscal year nineteen hundred and sixteen, and annually thereafter, in the regular Book of Estimates, submit to Congress estimates of the amount of money necessary to be expended for carrying out any or all of the purposes authorized by the reclamation law, including the extension and completion of existing projects and units thereof and the construction of new projects. The annual appropriations made hereunder by Congress for such purposes shall be paid out of the reclamation fund provided for by the reclamation law.

Approved, August 13, 1914.

COOPERATION WITH DEPARTMENT OF AGRICULTURE.

An Act Making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and fifteen.

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For investigations in connection with western irrigation agriculture, the utilization of lands reclaimed under the reclamation act, and other areas in the arid and semiarid regions, $70,380.

* * * * * * *

Demonstrations on reclamation projects: To enable the Secretary of Agriculture to encourage and aid in the agricultural development of the Government reclamation projects; to assist, through demonstrations, advice, and in other ways, settlers on the projects; and for the employment of persons and means necessary, in the city of Washington and elsewhere, $40,000.

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Approved, June 30, 1914.

PUBLIC PARK, MONTROSE, COLO.

An Act Authorizing the city of Montrose, Colorado, to purchase certain public lands for public park purposes.

Be it enacted by the Senate and House of Representatives of the United States of American in Congress assembled, That the city of Montrose, Montrose County, Colorado, is hereby authorized for a period of two years after the passage of this act to purchase, and the Secretary of the Interior is hereby directed to convey to said city for public park purposes, for the use and benefit of said city, the following-described lands, or so much thereof as the said city may desire, to wit: The south half of the southwest quarter, the southwest quarter of the southeast quarter of section nine; the northwest

quarter, the west half of the northeast quarter, the north half of the southwest quarter, and the west half of the southeast quarter of section sixteen, all in township forty-seven north, range seven west of the New Mexico principal meridian, containing five hundred and twenty acres, more or less.

SEC. 2. That the said conveyance shall be made of the said lands to the said city by the Secretary of the Interior upon the payment by said city for the said land, or such portions thereof as it may select, at the rate of $1.25 per acre, and patent issued to said city for the said land selected to have and to hold for public par purposes, subject to the existing laws and regulations concerning public parks, and that the grant hereby made shall not include any lands which at the date of the issuance of patent shall be covered by a valid, existing, bona fide right or claim initiated under the laws of the United States: *Provided*, That there shall be reserved to the United States all oil, coal, and other mineral deposits that may be found in the land so granted, and all necessary use of the land for extracting the same: *And provided further*, That said city shall not have the right to sell or convey the land herein granted, or any part thereof, or to devote the same to any other purpose than as hereinbefore described; and that if the said land shall not be used as a public park, the same, or such parts thereof not so used, shall revert to the United States.

SEC. 3. That the portion of the act of June seventh, nineteen hundred and ten, which authorizes the said city of Montrose to purchase the northwest quarter and the south half of the northeast quarter of section fourteen, township forty-nine north, range nine west of the New Mexico principal meridian, containing two hundred and forty acres, more or less, be, and the same is hereby, repealed.

Approved, May 9, 1914.

OPENING LANDS RESTORED FROM RESERVATION OR WITHDRAWAL.

An Act To authorize the President to provide a method for opening lands restored from reservation or withdrawal, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That hereafter when public lands are excluded from national forests or released from withdrawals the President may, whenever in his judgment it is proper or necessary, provide for the opening of the lands by settlement in advance of entry, by drawing, or by such other method as he may deem advisable in the interest of equal opportunity and good administration, and in doing so may provide that lands so opened shall be subject only to homestead entry by actual settlers only, or to entry under the desert-land laws for a period not exceeding ninety days, the unentered lands to be thereafter subject to disposition under the public-land laws applicable thereto.

SEC. 2. That where under the law the Secretary of the Interior is authorized or directed to make restoration of lands previously withdrawn he may also restrict the restoration as prescribed in section one of this act.

Approved, September 30, 1913.

ASSIGNMENT OF RECLAMATION HOMESTEAD ENTRIES IN FLATHEAD INDIAN RESERVATION.

An Act To extend the provisions of the act of June twenty-third, nineteen hundred and ten (Thirty-sixth Statutes at Large, page five hundred and ninety-two), authorizing assignment of reclamation homestead entries, and of the act of August ninth, nineteen hundred and twelve (Thirty-seventh Statutes at Large, page two hundred and sixty-five), authorizing the issuance of patents on reclamation homestead entries, to lands in the Flathead irrigation project, Montana.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the provisions of the act of June twenty-third, nineteen hundred and ten (Thirty-sixth Statutes at Large, page five hundred and ninety-two), authorizing the assignment under certain conditions of homesteads within reclamation projects, and of the act of August ninth, nineteen hundred and twelve (Thirty-seventh Statutes at Large, page two hundred and sixty-five), authorizing under certain conditions the issuance of patents on reclamation entries, and for other purposes, be, and the same are hereby, extended and made applicable to lands within the Flathead irrigation project, in the former Flathead Indian Reservation, Montana, but such lands shall otherwise be subject to the provisions of the act of Congress approved April twenty-third, nineteen hundred and four (Thirty-third Statutes at Large, page three hundred and two), as amended by the act of Congress approved May twenty-ninth, nineteen hundred and eight (Thirty-fifth Statutes at Large, page four hundred and forty-eight): *Provided*, That the lien reserved to the United States on the land patented, as provided for in section two of said act of August ninth, nineteen hundred and twelve, shall include all sums due or to become due to the United States on account of the Indian price of such land.

Approved, July 17, 1914.

PURCHASE, MAINTENANCE, AND REPAIR OF AUTOMOBILES, ETC., 1915.

An Act Making appropriations for the legislative, executive, and judicial expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and fifteen, and for other purposes.

* * * * * * *

SEC. 5. No appropriation made in this or any other act shall be available for the purchase of any motor-propelled or horse-drawn passenger-carrying vehicle for the service of any of the executive departments or other Government establishments, or any branch of the Goernment service, unless specific authority is given therefor, and after the close of the fiscal year nineteen hundred and fifteen there shall not be expended out of any appropriation made by Congress any sum for purchase, maintenance, repair, or operation of motor-propelled or horse-drawn passenger-carrying vehicles for any branch of the public service of the United States unless the same is specifically authorized by law, and in the estimates for the fiscal year nineteen hundred and sixteen and subsequent fiscal years there shall be submitted in detail estimates for such necessary appropriations as are intended to be used for purchase, maintenance, repair, or operation of all motor-propelled or horse-drawn passenger-carrying vehicles,

specifying the sums required, the public purposes for which said vehicles are intended, and the officials or employees by whom the same are to be used.

Approved, July 16, 1914. (Public, No. 127.)

PER DIEM IN LIEU OF SUBSISTENCE.

An Act Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and fifteen, and for other purposes.

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SEC. 13. That the heads of executive departments and other Government establishments are authorized to prescribe per diem rates of allowance not exceeding $4 in lieu of subsistence to persons engaged in field work or traveling on official business outside of the District of Columbia and away from their designated posts of duty when not otherwise fixed by law. For the fiscal year nineteen hundred and sixteen and annually thereafter estimates of appropriations from which per diem allowances are to be paid shall specifically state the rates of such allowances.

Approved, August 1, 1914. (Public, No. 161.)

INDIAN IRRIGATION, FISCAL YEAR 1915.

An Act Making appropriations for the current and contingent expenses of the Bureau of Indian Affairs, for fulfilling treaty stipulations with various Indian tribes, and for other purposes, for the fiscal year ending June thirtieth, nineteen hundred and fifteen.

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ARIZONA AND NEW MEXICO.

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For maintenance, care, and protection of machinery and irrigation wells already completed, in connection with the irrigation of the lands of the Pima Indians in the vicinity of Sacaton, in the Gila River Reservation, $10,000, reimbursable from any funds of said Indians now or hereafter available.

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For investigation recommended by the Board of Engineer Officers of the United States Army, as set forth in paragraph two hundred and seventeen of their report to the Secretary of War on February fourteenth, nineteen hundred and fourteen, House Document Numbered Seven hundred and ninety-one, Sixty-third Congress, second session, and report as to the supply of the legally available water, acreage available for irrigation and titles thereto, the maximum and minimum estimated cost of the San Carlos irrigation project, including dam and necessary canals, ditches, and laterals, with recommendations and reasons therefor, and the probable cost of adjudicating the water rights along the Gila River necessary thereto, and to take the steps necessary to prevent the vesting of any water rights in addition to those, if any, now existing until further action by Congress, $50,000.

CALIFORNIA.

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For reclamation and maintenance charge on Yuma allotments, $40,000, to be reimbursed from the sale of surplus lands or from other funds that may be available, in accordance with the provisions of the act of March third, nineteen hundred and eleven.

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MONTANA.

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For maintenance and operation, including repairs, of the Milk River irrigation system on the Fort Belknap Reservation, in Montana, $20,000, reimbursable in accordance with the provisions of the act of April fourth, nineteen hundred and ten.

For continuing the construction of irrigation systems to irrigate the allotted lands of the Indians of the Flathead Reservation, in Montana, and the unallotted irrigable lands to be or which have been heretofore disposed of under authority of law, including the necessary surveys, plans, and estimates, $200,000, reimbursable in accordance with the provisions of the act of April fourth, nineteen hundred and ten, and to remain available until expended.

For continuing the construction of irrigation systems to irrigate the lands of the Indians of the Blackfeet Indian Reservation, in Montana, including the necessary surveys, plans, and estimates, $50,000, reimbursable in accordance with the provisions of the act of March first, nineteen hundred and seven, and to remain available until expended.

For continuing construction of irrigation systems to irrigate allotted lands of the Indians of the Fort Peck Indian Reservation, in Montana, including necessary surveys, plans, and estimates, $50,000, the same to be reimbursable, and to remain available until expended: *Provided*, That the Secretary of the Interior is hereby authorized to make allotments in accordance with the provisions of the act of May thirtieth, nineteen hundred and eight (Thirty-fifth Statutes, page five hundred and fifty-eight), to children on the Fort Peck Reservation who have not received, but who are entitled to, allotments as long as any of the surplus lands within said reservation remain undisposed of, such allotments to be made under such rules and regulations as the Secretary of the Interior may prescribe.

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OKLAHOMA.

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That the Secretary of the Interior be, and he is hereby, authorized to contract for water rights for the irrigation of not to exceed six hundred acres of land in the Fort Sill Indian School Reservation, in the State of Oklahoma, within the proposed Lawton reclamation project for the irrigation of not to exceed two thousand five hundred acres of Indian and private lands, upon the same terms and condi-

tions as those prescribed for the acquisition of water rights for other lands to be irrigated by said project: *Provided*, That operation and maintenance charges shall not be assessed against said Indian land prior to the completion of the lateral system so as to provide for actual delivery of water thereto, and the project shall include lateral construction for the Indian lands down to each legal subdivision thereof equal in area to the size of the farm unit for lands in private ownership within said project.

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UTAH.

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For continuing the construction of lateral distributing systems to irrigate the allotted lands of the Uncompahgre, Uintah, and White River Utes, in Utah, and to maintain existing irrigation systems, authorized under the act of June twenty-first, nineteen hundred and six, to be expended under the terms thereof and reimbursable as therein provided, $10,000, to remain available until expended.

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WASHINGTON.

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It appearing by the report of the Joint Congressional Commission, created under section twenty-three of the Indian appropriation act, approved June thirtieth, nineteen hundred and thirteen (Senate Document Numbered Three hundred and thirty-seven, Sixty-third Congress, second session), that the Indians of the Yakima Reservation in the State of Washington, have been unjustly deprived of the portion of the natural flow of the Yakima River to which they are equitably entitled for the purposes of irrigation, having only been allowed one hundred and forty-seven cubic feet per second, the Secretary of the Interior is hereby authorized and directed to furnish at the northern boundary of said Yakima Indian Reservation, in perpetuity, enough water, in addition to the one hundred and forty-seven cubic feet per second heretofore allotted to said Indians, so that there shall be, during the low-water irrigation season, at least seven hundred and twenty cubic feet per second of water available when needed for irrigation, this quantity being considered as equivalent to and in satisfaction of the rights of the Indians in the low-water flow of Yakima River and adequate for the irrigation of forty acres on each Indian allotment; the apportionment of this water to be made under the direction of the Secretary of the Interior, and there is hereby authorized to be appropriated the sum of $635,000 to pay for said water to be covered into the reclamation fund; the amount to be appropriated annually in installments upon estimates certified to Congress by the Secretary of the Treasury. One hundred thousand dollars is hereby appropriated to pay the first installment of the amount herein authorized to be expended, and the Secretary of the Interior is hereby directed to prepare and submit to Congress the most feasible and economical plan for the distribution of said water upon the lands of said Yakima Reservation, in connection with the present system and with a view to reimbursing the Government for

any sum it may have expended or may expend for a complete irrigation system for said reservation.

For operation and maintenance of the irrigation system on lands allotted to Yakima Indians in Washington, $15,000, reimbursable in accordance with the provisions of the act of March first, nineteen hundred and seven.

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WYOMING.

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For continuing the work of constructing an irrigation system within the diminished Shoshone or Wind River Reservation, in Wyoming, including the maintenance and operation of completed canals, $25,000, reimbursable in accordance with the provisions of the act of March third, nineteen hundred and five, and to remain available until expended.

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Approved, August 1, 1914. (Public, No. 160.)

DECISIONS OF THE SECRETARY OF THE INTERIOR.

Below is given, under suitable headings, a digest of important decisions which have been rendered by the Secretary of the Interior during the past year relative to operations under the reclamation act. A few decisions by the comptroller are also included.

AREAS FOR WHICH WATER RIGHT MAY BE HELD.

A person who holds a farm unit shall not be permitted, before full payment has been made on the appurtenant water right, to acquire other lands with appurtenant water rights unless the water-right charges on the latter have been fully paid. A person may hold private lands with appurtenant water rights up to the limit of single ownership fixed for the project in one or more parcels before full payment of the water-right charge, but may not acquire other lands with appurtenant water rights unless the water-right charges thereon have been paid in full. The limit of area of the farm units and of single private-land holdings to which water rights are appurtenant, and as to which water-right charges have not been paid in full, shall in no case exceed 160 acres. (First Assistant Secretary, July 22, 1914.)

WATER-RIGHT APPLICATIONS BY CORPORATIONS.

No applications will be received from corporations on reclamation projects. That Congress did not intend that the reclaimed lands upon which the Government is expending the money of all the people should be the subject of corporate contract is conclusively established by the fact that the Secretary is authorized to fix the farm unit on the basis of the amount of land that will support a family. These lands are to be the homes of families. (Secretary, July 11, 1913.)

RECLAMATION—WATER-RIGHT APPLICATION.

The provision in the forms for water-right applications requiring payment by applicant of "betterment" or maintenance charges is a proper requirement under the reclamation laws, and the fact that at the time the entry was made there was no specific mentioned of "betterment" charges in the water-right application forms then in use will not relieve the entryman from payment of betterment charges legally assessed against his land. (42 L. D., 547.)

WATER-RIGHT APPLICATION—AGREEMENT NOT TO CONVEY TO DISQUALIFIED PERSON.

The provision in the form for water-right application by private-land owner requiring him to bind himself not to convey the land voluntarily to any person not qualified under the reclamation law to purchase a water right, upon condition that the application and any "freehold interest" sought to be conveyed shall be subject to forfeiture, is a reasonable and proper requirement, and an application from which such provision has been eliminated will not be accepted. (Id.)

AGREEMENT BY APPLICANT TO GRANT CONTROL OVER DITCHES, ETC.

The provision in the form of water-right application by private-land owner requiring applicant to agree that the United States or its successors shall have full control over all ditches, gates, or other structures owned or controlled by applicant and which are necessary for the delivery of water is in accordance with departmental regulations, and being a necessary incident to the proper management and operation of the project by the United States or its successors, is impliedly authorized by the reclamation act, and a water-right applicant will be required to conform thereto. (Id.)

AGREEMENT BY APPLICANT TO GRANT RIGHT OF WAY FOR DITCHES, ETC.

The provision in the form for water-right application by private-land owner requiring applicant to agree to grant and convey to the United States or its successors all necessary rights of way for ditches, canals, etc., for or in connection with the project is a proper requirement warranted by the spirit and intent of the reclamation act, and an applicant for water right will be required to conform thereto as a condition to allowance of his application. (Id.)

CAREY ACT SEGREGATION—WATER RIGHTS.

The Land Department has authority to require a State to show that water is available and has been duly appropriated for the reclamation of all public lands sought to be segregated and acquired under the Carey Act, but has no authority to require relinquishment of water appropriation under State laws in excess of the amount necessary to irrigate the lands segregated under that act, all questions concerning such appropriation being within the jurisdiction of the State. (42 L. D., 505.)

RESIDENCE REQUIREMENT—HOMESTEAD ASSIGNEE UNDER ACT OF JUNE 23, 1910.

The assignee of a homestead entryman under the act of June 23, 1910, is not required to reside upon the entry or in the neighborhood, this requirement having been fulfilled by the original entryman. No greater or additional obligations should be imposed upon the assignee than were imposed upon the original entryman, and the assignee is not required to repeat or duplicate, with respect to the lands assigned, the conditions already satisfied by the original entryman, and it remains for the assignee only to complete unfulfilled conditions. Congress imposed different conditions upon the owners of private lands than upon homesteaders, and the residence required of the private-land owner has no particular bearing upon the construction of law with respect to the homestead entryman. (First Assistant Secretary, Apr. 2, 1914.)

RECLAMATION HOMESTEAD—CULTIVATION.

The provisions of the three-year homestead act of June 6, 1912, respecting cultivation have no application to entries made under the reclamation act; but the reclamation laws require, as a prerequisite to the issuance of final certificate and patent, that the entryman shall have reclaimed for agricultural purposes at least one-half of the total irrigable area of his entry and paid all reclamation charges at that time due. (42 L. D., 534.)

RECLAMATION—SETTLEMENT UPON FARM UNIT.

Settlement upon any portion of a farm unit entitles the settler to claim, by virtue of such settlement, only lands contained in that farm unit.

ENTRY LIMITED TO FARM UNIT.

Lands platted to farm units can only be taken in accordance with the established units, and there can not be included in the same entry lands within a farm unit and other lands without. (42 L. D., 554.)

RIGHT OF WAY OVER LANDS WITHDRAWN UNDER THE RECLAMATION ACT.

A withdrawal under the reclamation act will not bar the allowance of an application for right of way under the act of March 3, 1891, over the withdrawn lands, where the allowance of the application will not interfere with the use of the lands by the United States in connection with the administration of the reclamation act, and where the water proposed to be conveyed over such right of way has not been appropriated and is not claimed by the United States. (42 L. D., 595.)

WAIVER OF LIQUIDATED DAMAGES.

A contract provision providing that for delays not due to certain enumerated causes liquidated damages at an agreed rate "*may*" be deducted for each day's delay is to be construed, time being of the

essence of the contract, as requiring that such damages *shall* be deducted for all delays not due to enumerated causes.

Where a contract provision confers upon the contracting officer authority to determine finally the cause and extent of delays, and elsewhere "every right and power" conferred upon said officer is delegated to another officer, the latter and not the former is the one properly to determine all questions as to delay. (20 Comp. Dec., 670.)

COURT COSTS IN STATE COURTS.

"In view of the fact that the Reclamation Service must proceed in many cases in conformity with State laws, and it is necessary to institute cases in State courts or intervene in those brought by others, the expense of such proceedings in State courts in the payment of lawful costs, including expenses of necessary printing and costs of appeal bonds, should be charged to the reclamation fund. It is understood, of course, that such proceedings on behalf of the United States will be instituted by or with the authority of the Attorney General, and that it is not intended by this decision to include compensation to attorneys or counsel." (Opinion Comptroller of Treasury, June 30, 1914.)

LITIGATION.

ARIZONA, SALT RIVER PROJECT.

On June 2, 1913, the Arizona Alfalfa Milling Co. petitioned the Court of Claims of the United States (No. 32485) for reimbursement of loss sustained by fire, which occurred September 15, 1911, at which time their mill and contents were completely destroyed. The amount of claim is $46,527.36. The company claims that the fire was due to defective wiring done by the Reclamation Service. Evidence in the case was taken at Phoenix, Ariz., June 15 to 17, inclusive, 1914.

ARIZONA-CALIFORNIA, YUMA PROJECT.

The only litigation in progress has been in connection with the construction of the Yuma Valley Railroad leading from the Southern Pacific tracks at Yuma into the lower Yuma Valley along the Colorado River levee. It became necessary to secure right of way through town property belonging to D. L. De Vane and Althee Modesti. This property lies on the line of the railroad between the Yuma Reservation and the Southern Pacific Railroad. Preliminary negotiations failed to secure agreement by either of these parties for immediate possession, and condemnation proceedings were started. Hearing to condemn and gain possession was set for April 25, 1914, in the United States district court for the district of Arizona, then sitting at Phoenix, Ariz., and order granting immediate possession to the Government issued on the same day. Trial to fix the value of the property was set for the Tucson, Ariz., term of this court on May 26, 1914. That docket was already overcrowded, and the case was held over until the November, 1914, term at the same place.

COLORADO, GRAND VALLEY PROJECT.

In the matter of the adjudication of water rights, district No. 42, Colorado, wherein is located the Grand Valley project, mentioned in the twelfth annual report, the Department of Justice instructed the special assistant to the Attorney General at Denver, Colo., to perfect appeal to the State supreme court. At the end of the fiscal year papers had been prepared to be filed for perfecting of the appeal by writ of error.

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

A suit for the adjudication of water rights in water district No. 40, State of Colorado, which has been pending before the district court of Delta County, Colo., for the past four years was finally closed on June 23, 1914, when Judge Black entered a decree setting forth the rights of the various claimants who appeared in the adjudication to the use of water. In this adjudication a decree concurrent with that given in a similar proceeding in water district No. 62 was given to the United States in connection with the Uncompahgre Valley project for 1,300 cubic feet per second of time from the Gunnison River and its tributaries of date June 1, 1901.

On March 17, 1911, condemnation proceedings were commenced in the United States district court for the district of Colorado against Aylmer F. Reeves to secure a strip of land for canal right of way across the NW. ¼ SW. ¼ sec. 21, T. 49 N., R. 10 W., New Mexico principal meridian, for the King lateral extension canal. This suit never came to trial, as settlement was effected with the defendant out of court. The suit will be dismissed at the next term of court, as the right of way in controversy was deeded to the United States October 20, 1913, and payment of the purchase price agreed upon made by the United States.

On April 20, 1912, condemnation proceedings were commenced in the United States district court for the district of Colorado against Jesse O'Neill and James O'Neill to secure a parcel of land for canal right of way in sec. 23, T. 49 N., R. 10 W., New Mexico principal meridian, for the Spring Creek lateral. On May 3, 1912, the defendants filed their answer and asked for the appointment by the court of a commission to determine the necessity for the taking of the right of way in controversy. On June 15, 1912, a reply to the answer of the defendants was filed on behalf of the United States. On June 26, 1912, a hearing was had at Denver, Colo., at which the questions of the right of the defendants to have a commission appointed for the purpose of determining the necessity for the taking of the right of way involved and the right of the United States to take immediate possession were argued. The court took the matter under advisement, and on August 19, 1912, found for the United States, since which time no further action has been taken in said suit, as settlement was effected with the defendants out of court. The suit will be dismissed at the next term of court, as deed to the property in controversy has passed to the United States and payment of the purchase price agreed upon has been made. (U. S. *v.* O'Neill, 198 Fed. Rep., 677.)

On April 25, 1912, an injunction suit was commenced in the United States district court for the district of Colorado by the United States against John A. Masters, Martin Van Horn, and other defendants to restrain them from interfering with the construction of the West Canal across the lands of defendants on the route selected for said canal under the provisions of the act of August 30, 1890. On the same date the court granted a temporary restraining order. A hearing was had on May 17, 1912, and on June 12, 1912, opinion was rendered sustaining the validity of the reservation and ordering that a temporary injunction be issued until final hearing. On September 12, 1912, another hearing was had in which the defendants sought to have the temporary injunction set aside, but Judge Lewis refused to change or modify his former decision. The right of appeal is still open to the defendants. (U. S. *v.* Van Horn et al., 197 Fed. Rep., 611.)

On September 11, 1905, an action entitled "The United States of America, to the use of the Montrose Hardware Co. et al., plaintiffs, *v.* C. D. McPhee et al., defendants," was commenced in the State district court. This suit was instituted by the creditors who furnished material and labor to the Taylor-Moore Construction Co., against the sureties on the bond of said company in connection with its contract for the construction of the Gunnison Tunnel. On March 24, 1908, judgment was entered dismissing said suit, from which plaintiffs appealed to the State supreme court. On December 12, 1911, following judgment, an order was issued reversing the judgment of the district court and remanding the cause to the district court for a new trial. On March 23, 1912, a petition of intervention was filed on behalf of the United States. On April 9, 1912, a demurrer of plaintiff to the petition of intervention by the United States was filed. A demurrer by defendant, J. B. Orman, to said petition of intervention of the United States was filed on April 27, 1912. Other pleadings in the way of amended answers and demurrers have been filed since January 1, 1912. On April 8, 1913, arguments were had on the demurrers to the bill of intervention filed by the United States. The demurrers were sustained, and the United States was given 30 days to amend its bill of intervention. Amended bill was filed by the United States on May 10, 1913. Trial of the cause was had before Judge Black at Montrose, Colo., from April 1 to 6, 1914, inclusive, who, after hearing the evidence presented and arguments of counsel, took the matter under advisement. On July 6, 1914, he rendered his opinion holding that the United States was not entitled to recover against the sureties, but that the sureties, with the exception of J. B. Orman, who was relieved from any and all liability, were liable to the plaintiffs and intervenors who furnished labor and material to the contractor. Exceptions to the decree were made on behalf of the United States as well as on behalf of the defendants. Motions for a new trial were filed by the defendants and by the United States on July 7, 1914. These motions were overruled. On request the United States and defendants were allowed 60 days within which to file a bill of exceptions to the decree.

On November 20, 1912, condemnation proceedings were commenced in the United States district court for the district of Colorado, against Emily Carrie Bever et al. to secure parcel of land for canal right of way in sec. 11, T. 48 N., R. 10 W., New Mexico principal

meridian, for the West Canal extension. On December 16, 1912, an order for immediate possession was given to the United States. Since said date the suit has been settled out of court. Deed to the land in controversy has passed to the United States and payment made to the defendants of the price agreed upon in settlement. The suit will probably be dismissed at the next term of court.

On June 19, 1913, a suit for the condemnation of a parcel of land in sec. 2, T. 50 N., R. 10 W., New Mexico principal meridian, was filed in the United States District Court for the District of Colorado against A. E. Buddecke and W. H. Crecelius. This suit will be dismissed at the next term of court, as deed to the right of way in controversy has passed to the United States and payment has been made to the defendants of the price agreed upon in settlement.

On January 13, 1914, a suit for the condemnation of two parcels of land in connection with the headgates of the East Canal was filed in the United States District Court for the District of Colorado against Linus E. Curtis et al. On February 14, 1914, an order giving the United States immediate possession of the land involved was entered. It is probable that the case will be tried at Montrose, Colo., at the fall term of court.

IDAHO, BOISE PROJECT.

United States v. Marsters and Lakin.—On July 11, 1913, Marsters and Lakin, acting as water commissioner and water master, respectively, for the State of Idaho for the Boise Valley district, cut the locks on the head gates of the Government canal at the diversion dam, Boise project, and shut down the gates, turning the water out of the canal. At this time there was sufficient water in Boise River to supply the Government canal and the old canals of the valley if distributed on the basis of 0.6 of a miner's inch per acre, but not enough if distributed on the basis of 1 miner's inch per acre. The duty of water from the Boise River at the time of this action had never been finally determined, but was at issue in the case pending in the State courts, the Government claiming that 0.6 of a miner's inch was sufficient and the old users claiming a miner's inch was necessary. Authority to file suit against Marsters and Lakin for injunction and damages was immediately asked, and complaint against Marsters and Lakin was filed on July 13, 1913. The Government claimed a right to damages and an injunction on two grounds: First. That the Government diversion dam and head gates are the property of the United States, located on the reserved public lands of the United States, and that the water commissioner and water master had no right to interfere with Government property under any conditions. Second. That without a decree of the court determining the duty of water the water commissioner and water master had no right to regulate the head gates of any canals, either private or Government.

The attorney general of the State and attorneys for several private canal companies, appearing for the defendants, Marsters and Lakin, filed demurrer and motion to dismiss on the ground that the State of Idaho has the right to control the waters within the State, that Marsters and Lakin were duly appointed officers of the State, and that they had a right to regulate the Government canal under the conditions stated in this case.

On the argument of this motion and demurrer the legal questions involved were thrashed out, and the motion to dismiss and demurrer were overruled by the court, the court holding with the Government on its second ground of complaint, namely, that without a decree of court determining the duty of water, the water commissioner and water master had no right to regulate any head gates, either Government or private.

The case is still pending for trial on the merits, the legal questions having been disposed of. The trial on the merits resolves itself chiefly into a matter of what damages can be proved and recovered from the defendants.

Farmers' Cooperative Ditch Co. v. Riverside et al.—In this case, which was filed about 12 years ago, to adjudicate the waters of Boise River among the various old canals, and which are still pending on the issue of the duty of water, an appearance has been filed by the United States attorney and district counsel as amicus curiæ for the purpose of securing a chance to introduce evidence. The district counsel also appeared as one of the attorneys for several of the canal companies, who, like the Government, are interested in securing a high duty of water. In this case application was made on July 18, 1913, for a temporary order of court for the remainder of that season, distributing the water on the basis of 0.6 of a miner's inch per acre. On July 18, 1913, the court entered the temporary order distributing the water on the basis of 0.6 of a miner's inch as prayed for by the Government attorneys.

On January 5, 1914, this case came up for final trial on the merits in the district court at Caldwell, and evidence was introduced and witnesses examined and cross-examined in this case continuously for the following two weeks, after which court adjourned to take up a term of court at Weiser and postponed the taking of the rest of the evidence until a date to be hereafter fixed by the court.

Pioneer Irrigation District v. American Ditch Co. et al.—On July 14, 1913, the Pioneer Irrigation District filed suit in the State court at Caldwell for the adjudication of the water rights from Boise River acquired after those involved in the case of Farmers' Cooperative Ditch Co. *v.* Riverside et al., making all the private canal companies parties defendant and also the Payette-Boise Water Users' Association, at the request of the association. The district counsel appeared as attorney for the association and filed answer.

United States v. American Ditch Co. et al.—On October 3, 1913, the United States filed in the Federal court for the Idaho district the above entitled suit to adjudicate its rights from Boise River as against other appropriators. About 150 private appropriators and canal companies were served and most of them have appeared and filed answer and cross complaints.

United States v. Highland Valley Power Co.—Mr. Peter J. Smith was appointed receiver for the defendant company and immediately made application to the United States for the settlement of this case, which had heretofore been offered to the Highland Valley Power Co. His application for settlement was refused at this time on account of his inability to furnish clear title to the rights of way required by the Government over the mining claims of the defendant company.

United States v. Oregon Short Line Railroad Co.—In January, 1914, the above case was dismissed. This is a case in which the United States filed complaint against the defendant, the Oregon Short Line Railroad Co., for condemnation of right to construct three siphons under the tracks of the company on the Boise and Minidoka projects. This suit was filed as a result of the inability to agree upon the terms of a contract for this purpose. After the filing of this suit an agreement granting rights of way for these crossings in the form satisfactory to the department, was signed by the railroad company and the suits later dismissed.

United States v. Quirk.—On January 22, 1914, the United States filed suit against Bridget Quirk and Patrick Quirk, her husband, for the purpose of condemning a tract of land in the Arrowrock Reservoir site, needed for reservoir purposes. The suit is still pending.

Page & Brinton v. United States.—In September, 1913, the taking of testimony in the case of Page & Brinton *v.* United States began at Boise and continued for about two weeks, during which time the witnesses for the claimants were examined and cross-examined. The taking of testimony was then adjourned until the summer of 1914, when it is expected that the witnesses for the Government will be examined. This is the case in the Court of Claims in which the plaintiffs, who were contractors on the Boise project, have filed suit for $325,000, growing out of dispute as to the classification of material removed by the contractors from the main canal, Boise project.

State Bank of Chicago v. Idaho-Oregon Light & Power Co., et al., United States, intervenor.—The above-entitled case was filed by the bondholders to foreclose their mortgages on all the properties of the defendant company, the Idaho-Oregon Light & Power Co., which had defaulted in the payment of its interest. At this time the defendant company was indebted to the United States about $15,000 for surplus power secured from the Government power plant, Boise diversion dam.

On December 6, 1913, the United States filed its complaint on intervention in this case, claiming judgment against the defendant company for the amount of this indebtedness, with interest, and claiming a preference over the general creditors and bondholders on the ground that the statute gives the United States preference over the other creditors of insolvent debtors, and also on the ground that the power furnished was operating supplies furnished to a public-service corporation immediately preceding its failure and therefore entitled to preference under the general law applicable to such cases. The case is still pending.

New York Canal Co. v. United States.—The New York Canal Co. filed a suit in the Federal court for the Idaho district against the United States under the Tucker Act, asking judgment for damages and the construction of contract between the company and the United States, under which the company's canal was taken over and enlarged as the main canal of the Boise project, the company claiming to be entitled to receive 277 second-feet of water under this contract; that the United States had delivered only 219 second-feet, and asking damages for failure to deliver the difference. The Government claimed that under the proper interpretation of the contract it was not required to deliver more than the 219 second-feet, which it did deliver. The case was tried before the court, and on December 31,

1913, the court rendered its judgment in favor of the United States and filed its opinion dismissing the case.

State of Idaho v. *Charles H. Paul and James Munn.*—On February 17, 1914, the sheriff of Boise County, upon the complaint of certain boarding-house keepers at Arrowrock, arrested Charles H. Paul, the construction engineer, and James Munn, the superintendent of construction, charging them with violating the State boarding-house act by discriminating in the employment and discharge of men in favor of those boarding at the Government mess. Authority was secured authorizing the United States attorney to appear for the defendants. The matter was taken up with the sheriff and county attorney by phone and arrangements made that the defendants could remain in the camp and appearance be made by their attorney. A conference was arranged with the county attorney and his attention called to various cases holding that the State was without jurisdiction to enforce such State statute against a Government officer on Government work, and particularly to the case of State of Ohio *v.* J. B. Thomas (173 U. S., 277). The county attorney agreed to dismiss the case against Paul and Munn.

In the meantime the sheriff, who was at Arrowrock, had been investigating the boarding house run by complaining witnesses, Winters and Robertson, and found that it was being run in violation of law and was not a reputable establishment. As a result, the suit against Paul and Munn was dismissed and a prosecution was filed against the complaining witnesses by the county attorney.

George R. Glover v. *Frank L. Brown, United States of America, et al.*—This case was filed in February, 1914, by the plaintiff against the defendants, Frank L. Brown, United States of America, and others, for the purpose of quieting title to a certain tract of land in the Boise project.

The interest of the United States in this tract consists of a right of way for a lateral of the Boise project, which was acquired by donation from Frank L. Brown, the claimant in possession.

It is believed that there is no authority for maintaining a suit of this kind against the Government, and motion to dismiss as to the United States has been filed.

State Bank of Chicago v. *Idaho-Oregon Light & Power Co.*—This case came up for hearing on June 26, 1914, upon the motion of the plaintiff, the trustee company, State Bank of Chicago, to dismiss bill of complaint on intervention of the United States in this case.

Permission was asked of the court by the United States to file an amended bill of intervention setting out more in detail the various grounds on which it is claimed that the indebtedness to the United States is a preferred claim, and also setting out such later events as have occurred since the previous bill was filed. Permission was granted and amended bill filed June 26.

Plaintiff's motion to dismiss was then argued as to the amended bill on intervention and was overruled by the court, and on June 28 the plaintiff filed an answer to the amended bill.

Farmers' Cooperative Ditch Co. v. *Riverside Irrigation District et al.* (*Boise River priority suit*).—On June 18, 1914, application was made to Judge Bryan, of the district court for Canyon County, for a temporary order distributing the waters of Boise River during the remainder of the irrigation season of 1914.

A temporary order for the season of 1914 was secured distributing the water on the basis of 1 miner's inch per acre from June 18 to July 15; 0.75 of a miner's inch per acre from July 15 to July 25; 0.6 of a miner's inch per acre from July 25 to the end of the irrigation season of 1914.

IDAHO, MINIDOKA PROJECT.

Brinck, receiver, v. *United States.*—During July, 1913, the evidence of the complainant's witnesses was taken at Boise and Rupert, Idaho, in the case of Brinck, receiver, *v.* United States. The taking of testimony was then adjourned in this case until the summer of 1914, when it is expected that the Government's evidence will be put in. This is a case brought by the receiver of Monarch & Porter, the contractors who constructed a portion of the main canal of the Minidoka project. This case is a suit for $122,148, brought in the Court of Claims, and grows out of the dispute as to the classification of the material excavated by the contractors on the main canal of the Minidoka project.

United States v. *Lincoln County et al.*—In this case the Federal court for the Idaho district on July 11, 1913, rendered final judgment and issued a permanent injunction as prayed for by the Government, restraining the county and county officials from taxing homestead lands on the Minidoka project for which patent has not been issued.

Minidoka & Southwestern Railroad Co. v. *United States.*—There has been no change in the status of this case since the last annual report. The case is still pending before the Supreme Court of the United States, but has not yet been reached by the court. A brief has been prepared by the Government, but the company has not yet served its brief.

United States v. *Salt Lake & Idaho Railroad Co.*—There has been no change in the status of this case during the past year. The temporary injunction issued by the court restraining the company from proceeding to construct a railroad on the proposed right of way without the consent of the Secretary of the Interior is still in effect, but the final trial of the case is being postponed to await the decision of the Supreme Court of the United States in the case of Minidoka & Southwestern Railroad Co. *v.* United States, in which case the same issues are involved.

KANSAS, GARDEN CITY PROJECT.

Testimony was taken on behalf of claimant and the Government during the fiscal year in the case of the Camden Iron Works *v.* The United States in the Court of Claims.

In March, 1913, a petition was filed by George H. Reeve against the Finney County Water Users' Association and about 100 members thereof asking that title be quieted in him as to certain lands and that the stock subscription to the association be held canceled. Answer was filed by the association and other defendants admitting the allegations of the complaint and asking that the Secretary of the Interior be made a party and that the contract between the associa-

tion and the Secretary be canceled and held for naught. Upon order of the State court the Secretary was made a party and service attempted by publication. Return day was fixed at May 7, 1913, and the case came on to be heard before that court on May 11, 1913, at which time special appearance was made for the Secretary of the Interior and suggestions filed by the Government officials raising the question of jurisdiction. The court thereupon entered orders overruling the special appearance, canceling the contract between the association and the Secretary, and quieting title in the various landowners by canceling their stock subscriptions. No further action had been taken by the United States at the end of the fiscal year.

MONTANA, BLACKFEET PROJECT.

In the case of George W. Cook and David D. La Breche *v.* The United States, reported on page 31 of the twelfth annual report, in which the United States District Court for the District of Montana rendered its decision confirming the selections of the plaintiffs to lands within the Lower Two Medicine Lake Reservoir site, stating that the value of their property destroyed exceeded the sum of $5,000, an agreement was entered into on December 29, 1913, at the instance of the Secretary of the Interior, between the United States and Cook and La Breche by which it was agreed that the value of the property decreed by the court to the plaintiffs should be submitted to a board of arbitrators for determination.

MONTANA, FLATHEAD PROJECT.

In August, 1913, the United States brought suit against F. W. Keeler et al. in the United States District Court for the District of Montana to recover possession of a tract of land required for construction purposes. The defendants had constructed a fence around the property and inclosed a public highway. Trial of the case was set for the October, 1913, term of court at Missoula, Mont., but in order that efforts could be made to adjust the case out of court the parties to the action stipulated for additional time for filing answer. If an adjustment can not be reached in the meantime it is probable the case will be tried at the October, 1914, term of court at Missoula.

On January 12, 1914, the United States instituted proceedings in the United States District Court for the District of Montana against the Missoula Orchards Co. to enjoin the defendant from diverting or interfering with the flow of Finley and Evaro Creeks, on the Flathead Indian Reservation. Answer was filed on March 6, 1914, and on April 13, 1914, the parties to the action stipulated for decree entitling the United States to all the waters of Finley and Evaro Creeks and their branches and enjoining and restraining the defendant from diverting or otherwise interfering with the waters of the two streams. Decree of court was entered, as stipulated, on April 15, 1914.

On March 16, 1914, John Rohrig filed suit in the State court for Sanders County, Mont., against Jesse Lee et al. to enjoin the defendants from diverting the waters of Clearwater Creek, a stream on the Flathead Indian Reservation, Rohrig claiming that he had a superior right to the use of such waters by reason of having filed notice of appropriation and constructed works in compliance with

the laws of Montana. The United States had made appropriation on Clearwater Creek and granted Jesse Lee a temporary permit to divert the waters from the creek. Lee appealed to the United States for protection under his temporary permit. In order to protect the interests of Lee in so far as the United States was obligated under the temporary permit and the interests of the United States in the use of the waters of Clearwater Creek which might be interfered with or threatened by the action brought by Rohrig against Lee, the United States took steps with the view of filing, if necessary, an application for injunction against the State court restraining it from decreasing any waters on Flathead Indian Reservation to lands in private ownership. It is now probable that the suit of Rohrig *v.* Lee et al. will be adjusted by granting Rohrig a temporary permit similar to that issued to Jesse Lee, provided the parties can reach a mutual agreement regarding the use of the waters of the stream, which are insufficient for use by both unless by means of rotation.

MONTANA, MILK RIVER, ST. MARY STORAGE UNIT.

The defendants' appeal to the Supreme Court of the United States in the suit brought by the United States against Caroline Henkel, Henry Henkel, her husband, and their several children, to recover possession to a tract of land south of Swiftcurrent Creek and adjacent to the north end of Lower St. Mary Lake, is still pending in the Supreme Court.

In the latter part of 1913 George Henkel, William Henkel, and Lizzie Henkel, members of the Piegan Tribe of Indians and wards of the Government, brought an action against the United States in the United States District Court for Montana, in which they claimed certain allotments of land at the foot of Lower St. Mary Lake. An amended complaint was filed in April, 1914. The United States filed answer in June, 1914, and the case was continued over the June term of court at Helena, Mont.

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

On September 24, 1913, complaint was filed on behalf of the United States in a suit brought in the United States District Court for Montana to acquire by condemnation from M. A. Hardy, Loren A. Hardy, the Bank of the Valley, and Annette Arndt, a tract of 5.63 acres of land for lateral D extension in sec. 3, T. 22 N., R. 59 E., Montana principal meridian. Summons was issued on September 30, 1913, and served upon each of the defendants, with the exception of M. A. Hardy, who could not be found more than 10 days before October 15, 1913, the date set for hearing. The defendants served failed to appear at the time and place designated, and the date of hearing was continued by order of court from time to time until March 7, 1914. An alias summons was issued on February 17, 1914, and served upon M. A. Hardy, notifying the defendant to appear before the court on March 7, 1914. The defendant failed to appear or answer the complaint either in person or by counsel. The court found that the purpose for which the land was sought to be appropriated was a public use, and that the land was necessary for such public use, and ap-

pointed commissioners to meet on March 31, 1914, and appraise the property. Order of court letting United States into possession was dated April 28, 1914.

In 1913 suit was started by the United States in the United States District Court for the District of Montana to compel specific performance on the part of Sylvia H. Lovering, administratrix, in making conveyance of lands required by the United States for canal rights of way and covered by agreements to sell executed by herself and husband, Frank H. Lovering, during his lifetime. Upon service of subpœna the defendant agreed to abide by the terms of the contracts previously entered into, and no further action was taken toward the prosecution of the suit. Sylvia H. Lovering, through her attorney, signed a petition to the State court for an order authorizing and directing her, as administratrix, to convey the lands. Court order was issued on May 15, 1913, directing her to convey, and deed was duly executed by her. Upon examination of the title papers it was discovered that the proceedings brought in the State court by Sylvia H. Lovering were insufficient, as notice of publication had not been posted as required by the State statute. Mrs. Lovering has refused to take action toward posting notice of publication and securing a new order from the court. The United States is taking steps with the view of presenting a petition to the State court and securing order directing the administratrix to make the conveyance.

In the case in the Court of Claims of The Pacific Coast Construction Co. *v.* The United States, reported on page 32 of the twelfth annual report, the testimony of Frank E. Weymouth, Charles H. Paul, and E. C. Bebb, on behalf of the defendants, was taken at Boise, Idaho, in August, 1913. Testimony of both plaintiff's and defendant's witnesses will be taken at Portland, Oreg., in August, 1914.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

The two cases of the North Platte Canal & Colonization Co. *v.* The United States, which have been mentioned in the eleventh and twelfth annual reports, were decided by the Court of Claims on May 18, 1914, upon demurrer to evidence of plaintiff. The defendant's demurrer was overruled and in each of the cases judgment was given for the claimant in the sum of 6 cents.

In the case of S. R. H. Robinson & Son Contracting Co. *v.* The United States (No. 32688 in the Court of Claims), the petition of the claimants, dated November 7, 1913, is based on an alleged claim for damages arising in connection with a certain contract, dated February 15, 1907, for the construction of a diversion dam and headworks on the North Platte project. The amount of the claim is $100,531.86. No testimony or action has been taken.

No action was taken by the United States in the several cases pending in the State and Federal courts involving matters in connection with water rights on interstate streams, mentioned in the twelfth annual report, although they have been closely followed by the service.

Studies were made during the year looking toward a determination or adjudication of water rights on the North Platte River.

NEVADA, TRUCKEE-CARSON PROJECT.

The condemnation suit relating to the outlet of Lake Tahoe against the Floriston Pulp & Paper Co. et al. has remained in statu quo since the issuance of the twelfth annual report. Negotiations are being carried on looking to the filing of a stipulation recognizing the existence of certain stated facts and outlining a system of storage control by the United States.

The proceedings in The United States *v.* Rickey Land & Cattle Co. remain indefinitely suspended. Proposal to dismiss, provided defendants show satisfactory arrangement with landowners, etc., still in force.

In the suit filed on March 3, 1913, by the United States against water users and claimants along the Truckee River and its tributaries for the adjudication of the relative rights to the waters of the stream system in Nevada a large number of answers have been filed setting out claims of defendants and resisting certain priorities of the United States alleged in its petition. Surveys and examinations are being made by the Reclamation Service engineers for use in preparing replications and at the trial.

In cases filed in the Court of Claims by the John Horstman and Natron Soda Cos., alleging appropriation by the Government, by way of seepage from the bordering irrigation canals, of the property of claimants in Big Soda Lake and Little Soda Lake, with plants and works connected therewith, some testimony has been taken, and preparations for final hearing are being carried forward, including special investigations of engineers, who are to be later used as witnesses. These claims are, respectively, for $35,000 and $170,000.

The case entitled The Western Co. *v.* Stone & Webster Construction Co. retains the status revealed in the twelfth annual report.

NEW MEXICO, HONDO PROJECT.

The case of The United States *v.* El Paso & Rock Island Railway Co. et al., mentioned on page 34 of the twelfth annual report, is still pending. Answers have been filed by most of the defendants but no testimony has been taken. Efforts are being made looking to a compromise among certain of the defendants, and consideration is being given the advisability of limiting the present scope of the case.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

In the case of Oscar C. Snow *v.* Francisco Abalos et al., referred to on page 34 of the twelfth annual report, an appeal was taken by the plaintiff from the action of the district court in sustaining demurrer interposed by one of the defendants on the ground that the action should have been prosecuted in the name of the community ditch association of which plaintiff was a party and not in his individual capacity. Motion to make the complaint more definite in certain features was also filed by one of the defendants and sustained by the trial court. The Supreme Court at the January term, 1914, reversed the action of the district court and directed that the demurrer and motion to make definite be overruled. No testimony has been taken in the case.

No substantial progress has been made in the case of the El Paso Valley Water Users' Association *v.* W. H. Austin et al., mentioned on page 34 of the twelfth annual report. The attorneys for the association are doubtful of the advisability of prosecuting the case to final determination at this time, and certain features of the case are now being considered before the case will be prosecuted to final decree.

November 29, 1913, two suits in eminent domain were filed in the United States district court for the district of New Mexico—one entitled United States *v.* Lauteria Birner et al., affecting lands in Socorro County, N. Mex., and the other entitled United States *v.* Jose Antonio Anaya et al., affecting lands in Sierra County, N. Mex., all of the lands in question being required for flowage purposes in connection with the Engle Reservoir. There are affected by the two suits about 135 tracts of land, aggregating some 3,500 acres.

Return of the commissioners appointed to appraise the lands in the case first mentioned was filed June 11, but the report has not been confirmed by court. No report by the commissioners has been filed in the other case.

OREGON, UMATILLA PROJECT.

In the determination of the relative rights to the waters of the Umatilla River and its tributaries, the taking of evidence and testimony before the water superintendent was fully completed; all remaining necessary stipulations were filed, thus disposing of the 188 contests initiated by the Government, the 3 directed against the United States, and the 40 or more controversies between private parties. The Government's opening argument upon the evidence and testimony was filed with the water superintendent and served upon opposing counsel February 7, 1914. Several answering briefs have been filed, which were replied to by the United States on May 29. It is the expressed intention of the State officers to publish a decree of determination in the immediate future, which under the water-code procedure will later be filed with and, after exceptions thereto are disposed of, become a decree of the local circuit court.

The case entitled Maxwell Land & Irrigation Co. *v.* The Hermiston Bank & Trust Co., involving an attempt by plaintiff to prevent sales of its lands at auction under the trust, at the designation of the Secretary of the Interior, was decided by the State supreme court March 31, 1914, the chief counsel of the Reclamation Service presenting an argument as amicus curiæ. It was in that tribunal on appeal from a ruling of the local circuit sustaining the demurrer interposed by the United States attorney in the trust company's behalf, the decision of said circuit court that it had no jurisdiction being affirmed. Petition for rehearing was filed April 18, 1914, and overruled April 21. Mandate was issued April 23.

OREGON-CALIFORNIA, KLAMATH PROJECT.

The case entitled Klamath Lake Navigation Co. *v.* California Northeastern Railway Co. and Southern Pacific Co., relating to the closing of the Klamath Strait to navigation, in which the Government intervened by way of suggestion on September 30, 1910, has remained in statu quo since motion to strike and demurrer to the Government's suggestion was overruled on November 10, 1910.

Condemnation proceedings against William Albright and wife and M. P. Mickler for right of way for second unit laterals have been settled by way of contract providing for payment of $1,175 to defendants and agreement to construct certain farm bridges. Delay in closing transaction and accomplishing dismissal of case was caused by the necessity for obtaining various further assurances of title. Authority to dismiss now issued.

In the case entitled United States *v.* C. A. and M. Veneta Bunting, initiated for the purpose of enjoining defendants from cutting or interfering with Government canals traversing their properties, memorandum opinion and order for decree was issued by the United States District Court for Oregon on July 28, 1913, decree providing for perpetual injunction being filed October 25, 1913.

A suggestion in behalf of the United States, giving notice, without submitting to the jurisdiction of the State tribunal, of the reserved and appropriated prior rights of the Government and outlining limitations upon the rights of others in that regard, was filed on October 10, 1913, in the determination of the relative rights to the waters of the Lost River and its tributaries pending before the State water board. The practical completion of this State proceeding is expected during the current calendar year.

Condemnation proceedings against Robert A. Miller for the acquisition of land for right of way for the Dixon and Worden drains, as the same are projected to traverse the property of defendant, were initiated on February 6, 1914, answer being filed March 9 of this year. The allegations of said answer have been made the subject of careful investigations upon the ground, and replication is being prepared and preparations for trial carried on.

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

In the case of the Widell-Finley Co. et al. *v.* United States, No. 31436, in the Court of Claims, the plaintiff offered all its testimony during the fiscal year, and the case is now ready for the submission of evidence on behalf of the Government.

The case of the Belle Fourche Valley Water Users' Association *v.* Magruder et al. is now pending. In this case the Belle Fourche Valley Water Users' Association filed a petition July 19, 1913, in the State court and secured a restraining order without notice by which the project manager and others were restrained and enjoined from shutting off the water of the members of the association for failure to pay certain charges. On August 1, 1913, the case was removed to the United States district court upon petition of defendants, and on August 6 the defendants filed motion to dismiss the action and dissolve the temporary injunction. On August 28, 1913, the cause came on to be argued at Deadwood, S. Dak., before James D. Elliott, judge of the United States district court for South Dakota, whereupon the court expressed the view that under a liberal construction of the complaint he was disposed to deny the motion. Attorneys for the plaintiff thereupon requested and were granted 30 days in which to file an amended complaint, which was later extended to October 8 by stipulation. The amended bill was filed October 8, 1913. By this amended complaint the plaintiffs also asked that the defendants be further enjoined from collecting any charges whatever until final

completion of the project, from collecting any so-called betterment charges, and from canceling or recommending for cancellation any homestead entries or water-right applications of its shareholders pending the determination of the action. The record is extremely voluminous. From November 28 to December 1, 1913, arguments were had before the same court at Sioux Falls, S. Dak., upon affidavits and showing made by the defendants, at the conclusion of which the court entered orders denying defendants' motion to dismiss and dissolve the temporary restraining order and granting defendants 30 days within which to file their answer. The court also ordered that pending the final hearing the defendants, their agents, and employees be enjoined and restrained from collecting or attempting to collect any charges whatever for construction and from collecting or attempting to collect betterment charges or collecting or attempting to collect any operation and maintenance charges for the years 1908 to 1912, inclusive, and from canceling, attempting to cancel, or recommending for cancellation any homestead or water-right applications of the shareholders for neglect, failure, or refusal to pay any or either of said charges and further enjoining the defendants from shutting off water supplied through the project. On December 20, 1913, the court upon petition of defendants granted an order allowing an appeal to the circuit court of appeals, eighth circuit, from the interlocutory orders theretofore granted. On February 18 the clerk of the court filed the printed record. Thereupon briefs were prepared and filed by defendants and by plaintiffs, and on June 4 the appeal from the interlocutory orders was argued before the circuit court of appeals. At the end of the fiscal year decision by that court had not been made. In the meantime answer was filed in January, 1914, but the trial of the case has been postponed pending a decision by the circuit court of appeals.

In November, 1913, Samuel R. H. Robinson filed suit in the Court of Claims (No. 32678) claiming $17,145.25 on an alleged claim for damages arising in connection with a certain contract dated April 24, 1905, for the construction of schedule 1, main supply canal, Belle Fourche project. No evidence was submitted during the year.

During the irrigation season of 1913 a ditch rider was threatened by use of a deadly weapon unless he opened the head gate of a water user, contrary to instructions and regulations. Arrest of the offender was effected under the State statute, and the State court imposed the statutory fine.

WASHINGTON, YAKIMA PROJECT.

In the case of the United States *v.* Theodore Weisberger, in the United States district court for the eastern district of Washington, southern division, referred to on page 36 of the twelfth annual report, a judgment of affirmance was rendered by the circuit court of appeals on August 4, 1913, and filed September 8.

In the suit brought against the Union Gap Irrigation Co. to enjoin the diversion of water, page 36, twelfth annual report, additional testimony was taken before an examiner, and on August 23, 1913, an opinion was rendered by the court.

An injunction was granted against two attempted transfers of the places of enjoyment of water rights, shown to be prejudicial to the United States. October 22 decree was entered accordingly.

In a second suit brought against the same corporation for damages, an order of dismissal was entered on October 23, 1913. The case proceeded no further than the filing of pleadings.

A third suit to compel the Union Gap Irrigation Co. to install proper safeguards in the construction of its canal, referred to on page 36, twelfth annual report, was dismissed on March 26, 1914, after the required improvements had been satisfactorily completed by defendant.

In the case of the United States *v.* West Side Irrigating Co., referred to on page 37 of the twelfth annual report, an examiner has been appointed and July 1 has been set for the purpose to take testimony.

The case of United States *v.* H. E. Nicolai, reported on page 35 of the eleventh annual report, was dismissed on January 29, 1914, the proposed construction of the dam complained of as a menace to the canal of the United States having been abandoned.

WYOMING, JACKSON LAKE ENLARGEMENT PROJECT.

On February 10, 1914, the State engineer of Wyoming rejected the applications for the enlargement of Jackson Lake Reservoir on the ground that they threatened to prove detrimental to the public interests. It is understood that the reason for the rejection of the permits was the possibility that the stored water to be run in Snake River from this reservoir would increase the height of the river and interfere to some extent with certain fords in Wyoming.

On April 7, 1914, an appeal was taken from the ruling of the State engineer to the board of control.

WYOMING, SHOSHONE PROJECT.

In the suit instituted against the United States in the Court of Claims by the United States Fidelity & Guaranty Co. of Baltimore, Md., bondsmen of Prendergast & Clarkson, original contractors on the Shoshone Dam, for recovery of $822,777.58 as damages and for extra work performed, testimony was taken on behalf of both plaintiff and defendant at Great Falls, Mont., in July, 1913, and on behalf of the defendant at San Francisco, Cal., in August, 1913.

PUBLIC NOTICES AND ORDERS.

During the fiscal year ending June 30, 1914, 14 formal public notices and orders were issued by the Secretary of the Interior in connection with the operation of the projects affected. These notices and orders are printed in the discussions of the individual projects. In addition, the following orders and public notices relating to all projects were issued:

ORDER DATED JULY 15, 1913.

Public notice of June 23, 1913, under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, provided in paragraph 9 as follows:

No water-right applicant shall be entitled to the above reduction in the building charge unless he has paid the charges for operation and maintenance now

due and has prepared for irrigation and has irrigated in good faith, for the purpose of raising agricultural crops, one-half the entire irrigable area of his tract or not less than 5 acres for each full irrigation season since the water was available therefor.

It is hereby ordered that the number of full irrigation seasons as provided for in said paragraph shall be counted from the time when the present owner of the land first secured control thereof.

FRANKLIN K. LANE.

ORDER DATED JULY 21, 1913.

In view of the unusual requirements regarding operation and maintenance payments during the current year on the various projects constructed under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), such requirements being made necessary by reason of postponement of payments from various causes.

It is hereby ordered that water users who are actually unable to pay such charges and who shall have failed to pay them by July 21, 1913, may be allowed to receive water after making an agreement in writing to make an additional and further payment of 1 cent per acre for each month which elapses in whole or in part from July 21, 1913, to the date of payment. Such additional charge shall be separately added to each portion of an installment for operation and maintenance remaining unpaid on and after July 21, 1913; that is to say, those who owe portions of installments for operation and maintenance for two years shall be required to add the amount of 2 cents per acre per month or fraction of a month.

A. A. JONES, *Acting Secretary.*

ORDER DATED JANUARY 19, 1914.

In view of the misinterpretation of the order of July 21, 1913, whereby a penalty of 1 cent per acre per month was deemed to apply only on operation and maintenance charges as to which the water user had applied for an extension of time, it is ordered that as to all water users who pay their operation and maintenance charges due in 1912 and 1913 on or before March 1, 1914, the penalties assessed under the above-cited order be remitted, and that all who have paid operation and maintenance charges, together with the penalty assessed thereon, receive as credit upon future payments the amount of the penalties so paid.

A. A. JONES, *First Assistant Secretary.*

ORDER DATED MAY 29, 1914.

No action under order of June 23, 1913, will be taken awaiting action of Congress on extension bill. If said bill is not enacted into law by August 1, an order will be made requiring payment by August 15. If passed, an order will be made by August 15 in conformity with the terms of the new law.

FRANKLIN K. LANE.

PUBLIC NOTICE DATED SEPTEMBER 24, 1914.

1. In pursuance of the provisions of the reclamation extension act of August 13, 1914 (Public, No. 170), notice is hereby given that the charges for a water right for lands under the several projects and units thereof for which public notice or notices have heretofore issued are of two kinds: (1) A charge per irrigable acre for the building of the irrigation system, termed the construction charge; (2) an annual charge for each acre-foot of water delivered, payable at such time as may hereafter be fixed, for the operation and maintenance of the project or a unit thereof. Each acre of irrigable land, whether irrigated or not, will be charged with a minimum operation and maintenance charge based upon the charges for delivery of not less than one acre-foot of water.

2. The amount of the construction charge per irrigable acre for lands for which entry under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), or water-right application has heretofore been made, shall be the amount fixed in the several public notices heretofore issued for the respective lands and therein termed "the building charge," and will not be increased except as provided in said reclamation extension act.

3. Any person whose land or entry has heretofore become subject to the terms and conditions of the reclamation law may secure the benefits of the extension of the period of payments provided for in the said reclamation extension act by notifying the Secretary of the Interior of his acceptance of all the terms and conditions of said act. Such notice of acceptance shall be in the form prescribed by the Secretary, and may be obtained from the project manager on application. Such acceptance must be filed with the project manager within six (6) months from the date of this public notice. The construction charge for the lands or entries of persons so accepting the benefits of the period of extension, or so much thereof as may remain unpaid at the time of filing said notice of acceptance, must be paid in not more than twenty (20) annual instalments, the first of which instalments will be due December 1, 1914, and the subsequent instalments due December 1 of each year thereafter. The first four of such annual instalments shall be each two (2) per centum and the next two instalments each four (4) per centum, and the remaining fourteen instalments each six (6) per centum of the said construction charge, or of the portion thereof remaining unpaid at the time of filing said notice of acceptance as the case may be. The whole or any part of the construction charge may be paid within any shorter period than 20 years if so desired.

4. The method of determining the annual operation and maintenance charge, the penalties for failure to pay the construction charges and the operation and maintenance charges when due, the reclamation requirements, and the discount allowed for prepayment of the operation and maintenance charges are prescribed by the said reclamation extension act.

FRANKLIN K. LANE,
Secretary of the Interior.

PURCHASES OF RIGHTS AND PROPERTY.

The following purchases of rights and property were made during the fiscal year ending June 30, 1914:

Purchases of rights and property.

ARIZONA, SALT RIVER PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Ellingson, Mons, and wife	Right of way across sec. 33, T. 1 S., R. 4 E., G. & S. R. B. & M.	$300.00	Nov. 7, 1912
Garner, G. E., et al	1.05 acres in W. ½ NW. ¼ sec. 3, T. 1 S., R. 4 E., G. & S. R. M.	100.00	Oct. 25, 1913
Hesse, John F., John F., jr., and Martha E.	0.537 acre of land in SE. ¼ NW. ¼ sec. 20, T. 2 N., R. 3 E., G. & S. R. B. & M. (Secured by condemnation.)	350.00	
Ingleside Co	Lots 1 and 2, block 56, town site of Ingleside, Maricopa County, Ariz.	150.00	June 14, 1913

ARIZONA-CALIFORNIA, YUMA PROJECT.

Cloyd, W. B., and wife	Purchase of improvements on strip of land in S. ½ SE. ¼ sec. 26, R. 24 W., G. & S. R. M.	$99.00	May 16, 1913
De Vane, Duncan L., and wife.	Purchase of improvements on strip of land in lot 1, frac. sec. 20, T. 8 S., R. 23 W., G. & S. R. M.	320.00	Nov. 6, 1913
Ferguson, Wm. G	Lots 1, 2, 5, 6, sec. 6, T. 14 S., R. 24 E., and E. ½ NE. ¼ E. ½ SE. ¼ sec. 1, T. 14 S., R. 23 E., containing 304.03 acres. Lots 4 and 7, sec. 6; lots 1 and 2, sec. 7, T. 14 S., R. 24 E., containing 120.5 acres. Lots 2, 3, and 4, SE. ¼ NW. ¼ NW. ¼ SE. ¼ sec. 25, T. 13 S., R. 23 E., containing 165.13 acres. E. ½ E. ½ sec. 36, T. 13 S., R. 23 E., containing 160 acres; all in S. B. M.	1,500.00	Mar. 20, 191
Gallaher, Geo. L., and wife	Purchase of improvements on strip of land in W. ½ SE. ¼ sec. 5, T. 10 S., R. 24 W., G. & S. R. M.	16.00	Mar. 8, 1913
Grothaus, Louis C., and wife	Purchase of improvements on strip of land in SE. ¼ NE. ¼ sec. 23, T. 9 S., R. 24 W., G. & S. R. M.	60.00	Aug. 18, 1913
Henry, Joseph R	Purchase of improvements on NW. ¼ sec. 15, T. 8 S., R. 22 W., G. & S. R. M.	336.00	Aug. 9, 1913
Lawler, Roy	Purchase of improvements on strip of land in W. ½ NW. ¼ NE. ¼ sec. 36, T. 8 S., R. 24 W., G. & S. R. M.	60.00	Apr. 22, 1914
Lawler, W. A., and wife	Purchase of improvements on strip of land in NE. ¼ NE. ¼ sec. 36, T. 8 S., R. 24 W., G. & S. R. M.	53.00	Apr. 25, 1914
Lent, V. H., and wife	Purchase of improvements on strip of land in NW. ¼ sec. 28, T. 10 S., R. 24 W., G. & S. R. M.	230.00	Feb. 18, 1914
McClelland, G. S	Purchase of improvements on strip of land in E. ½ SE. ¼ sec. 26, T. 9 S., R. 24 W., G. & S. R. M	75.00	Oct. 1, 1913
Milligan, Lina M	Purchase of improvements on strip of land in E. ½ NW. ¼ sec. 26, T. 9 S., R. 24 W., G. & S. R. M.	113.43	July 12, 1913
Moore, Anna M., and Albert W. Moore, her husband.	Purchase of improvements on strip of land in SW. ¼ NW. ¼ sec. 4, T. 9 S., R. 24 W., G. & S. R. M.	50.00	May 19, 1913
Murray, J. S., and P. F. Byrne.	Purchase of lot 33 of block 3 of Townsend tract of Yuma, Ariz.	200.00	Jan. 10, 1912
Nixon, William Elwood, and James Taylor Nixon.	Purchase of improvements on strip of land in N. ½ SW. ¼ sec. 2, T. 10 S., R. 24 W., G. & S. R. M.	25.00	Apr. 11, 1914
Stearns, L. B., and wife	Purchase of improvements on strip of land in W. ½ NW. ¼ SE. ¼ and strip of land in NE. ¼ SW. ¼ sec. 36, T. 8 S., R. 24 W., G. & S. R. M	25.00	Apr. 11, 1914
Thacker, J. M., and wife	Purchase of improvements on strip of land in S. ½ NE. ¼ sec. 30, T. 8 S., R. 23 W., G. & S. R. M.	45.00	May 19, 1913
Toler, John I., and wife	Purchase of improvements on strip of land in SW. ¼ SE. ¼ NE. ¼ sec. 10, and on a strip of land in N. ½ NE. ¼ NE. ¼ sec. 10, T. 10 S., R. 24 W., G. & S. R. M.	38.00	Nov. 15, 1912
Williams, John M., and wife	Purchase of improvements on strip of land in NE. ¼ sec. 17, T. 10 S., R. 24 W., G. & S. R. M.	19.56	Mar. 14, 1914
Witty, E. L., and wife	Purchase of improvements on strip of land in W. ½ SW. ¼ SW. ¼ sec. 23, T. 8 S., R. 24 W., G. & S. R. M.	9.10	May 6, 1914

Purchases of rights and property—Continued.

CALIFORNIA, ORLAND PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Chester, Martha H., and John D.	Strip of land across sec. 6, T. 17 N., R. 6 W., M. D. B. & M.	$850.00	Feb. 5, 1914
Kesselring, F. M., and wife	Strip of land across NW. ¼ SE. ¼ and NE. ¼ SW. ¼ and S. ½ NW. ¼ and lot 4 sec. 5, T. 17 N., R. 6 W., M. D. B. & M., and lot 15 sec. 31, T. 18 N., R. 6 W., M. D. B. & M.	2,000.00	Apr. 2, 1914
Kraus, William, et al	Strip of land across SE. ¼ sec. 5, T. 17 N., R. 6 W., M. D. B. & M.	200.00	Mar. 24, 1914
Mason, G. L., and wife	Strip of land across lot 16 sec. 36, T. 18 N., R. 7 W., M. D. B. & M.	500.00	Jan. 29, 1914
Millsaps, J. W., and wife	Strip of land across SW. ¼ NW. ¼ sec. 10, and SE. ¼ NE. ¼ sec. 9, and SE. ¼ SE ¼ and E. ½ SW. ¼ sec. 9, and N. ½ SW. ¼ and W. ½ NW. ¼ sec. 9, and NE. ¼ NE. ¼ sec. 8, all in T. 17 N., R. 6 W., M. D. B. & M.	3,000.00	Mar. 9, 1914
Morris, John M., and wife	Strip of land across lots 13 and 14 sec. 31, T. 18 N., R. 6 W., M. D. B. & M.	500.00	Jan. 27, 1914
Nielson, C. L	Strip of land through sec. 2, T. 22 N., R. 3 W., M. D. B. & M., 1.39 acres.	1.00	Mar. 7, 1914
Orland Unit Water Users' Association.	Strip of land across lot 13 sec. 31, T. 18 N., R. 6 W., M. D. B. & M.	1.00	Dec. 8, 1913
Do	Strip of land across lot 14 sec. 31, T. 18 N., R. 6 W., M. D. B. & M.	1.00	Dec. 19, 1913

COLORADO, GRAND VALLEY PROJECT.

Cameo Coal & Land Co	Improvements on right of way across SE. ¼ SW. ¼ NW. ¼ SE. ¼ sec. 27, and NE. ¼ NW. ¼ sec. 34, T. 10 S., R. 98 W., 6th M.	$1,385.00	Aug. 23, 1913
Cutter, John H., et al	1.04 acres in W. ½ SE. ¼ SW. ¼ sec. 5, T. 11 S., R. 98 W., 6th P. M., for canal right of way.	2,000.00	Apr. 7, 1913
Devault, Tom	Improvements on right of way across NE. ¼ NW. ¼ sec. 1, T. 1 S., R. 1 E., Ute M.	400.00	Oct. 1, 1913
Giberson, H. P	Improvements on right of way across E. ½ E. ½ SW. ¼ SE. ¼ sec. 6, T. 11 S., R. 98 W., 6th M.	2,050.00	Mar. 2, 1914
Huston, Frank, estate of	Improvements on right of way across W. ½ E. ½ SW. ¼ NE. ¼ sec. 4, T. 1 S., R. 1 E., Ute M. (undivided one-half interest).	600.00	Dec. 19, 1913
Liggett, Joseph W	Improvements on right of way across that part of lot 3, sec. 12, T. 11 S., R. 99 W., 6th M., lying north of Palisade irrigation district canal.	175.00	Sept. 2, 1913
Potter, Sara A	Improvements on right of way across E. ½ E. ½ SE. ¼ SE. ¼ sec. 5, T. 11 S., R. 98 W., 6th M.	600.00	Oct. 1, 1913
Wallace, W. S., and W. G. Boyer.	Improvements on right of way across W. ½ SW. ¼ sec. 34, T. 10 S., R. 98 W., 6th M.	.....	July 24, 1913
Do	Site for power plant in SW. ¼ SW. ¼ sec. 34, T. 10 S., R. 98 W., 6th M.	250.00	Mar. 20, 1914
Wyant, Frank C	Improvements on right of way across E. ½ E. ½ SW. ¼ SE. ¼ sec. 6, T. 1 S., R. 1 E., Ute M. (undivided one-half interest).	600.00	Aug. 20, 1913
Yeaton, Arleigh M	Improvements on right of way across SE. ¼ SW. ¼, sec. 3, T. 1 S., R. 1 E., Ute M.	550.00	Oct. 22, 1913

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

Adams, Leonard W	Portion of SE. ¼ NE. ¼, sec. 34, T. 51 N., R. 10 W., N. M. P. M., containing 0.49 acre, more or less.	$1.00	Apr. 27, 1914
Baird, Leonard	Portion of SW. ¼ SE. ¼ and NW. ¼ SE. ¼ sec. 27, T. 15 S., R. 96 W., 6th P. M., containing 1.34 acres, more or less.	1.00	May 4, 1914
Bever, Mrs. E. C., and Charles S.	Portion of NW. ¼ SE. ¼ and NE. ¼ SW. ¼ sec. 11, containing 4.54 acres; portion of SW. ¼ NW. ¼ sec. 11, containing 2.75 acres; all in T. 48 N., R. 10 W., N. M. P. M.	600.00	Mar. 22, 1913
Bruce, George W	Portion of NW. ¼ NE. ¼ sec. 26, T. 15 S., R. 96 W., 6th P. M., containing 0.046 acre, more or less.	1.00	May 12, 1914
Buddecke, A. E	Portion of NE. ¼ SE. ¼ sec. 2, T. 50 N., R. 10 W., N. M. P. M, containing 3.67 acres, more or less.	500.00	Nov. 7, 1913
Caddy, Miranda and Harry	Portion of SE. ¼ NW. ¼ sec. 15, T. 50 N., R. 10 W., N. M. P. M., containing 0.25 acre, more or less.	25.00	Sept. 25, 1913

Purchases of rights and property—Continued.

COLORADO, UNCOMPAHGRE VALLEY PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Calkins, Albert R. and Julia J.	Portion of NE. ¼ NE. ¼ sec. 10, containing 1.06 acres; portion of NE. ¼ NE. ¼ sec. 10, containing 1.37 acres; portion of NW. ¼ NE. ¼ sec. 10, containing 0.93 acre; all in T. 48 N., R. 10 W., N. M. P. M.	100.00	July 6, 1913
Calkins, Julia J., and Albert R.	Portion of SE. ¼ NE. ¼ sec. 10, T. 48 N., R. 10 W., N. M. P. M., containing 0.20 acre, more or less.	1.00	July 6, 1913
Christianson, B. B	Portion of E. ½ NW. ¼ sec. 32, T. 50 N., R. 9 W., N. M. P. M., containing 2.50 acres, more or less.	100.00	May 5, 1914
Cleveland, George S	Portion of E. ½ SW. ¼ sec. 15, T. 50 N., R. 10 W., N. M. P. M., containing 4.6 acres, more or less.	1.00	May 28, 1913
Do	Portion of NE. ¼ SW. ¼ sec. 15, T. 50 N., R. 10 W., N. M. P. M., containing 2.6 acres, more or less.	300.00	Oct. 25, 1913
Dominey, William H	Portion of SE. ¼ NW. ¼ sec. 20, T. 15 S., R. 96 W., 6th P. M., containing 0.104 acre, more or less.	1.00	May 28, 1914
Duling, W. M	Portion of SW. ¼ NE. ¼ sec. 33, T. 15 S., R. 95 W., 6th P. M., containing 0.165 acre, more or less.	1.00	June 24, 1914
Fallon, Mrs. Alma, and Rhyan, Mrs. Annie C.	Portion of SW. ¼ NW. ¼ sec. 7, containing 3.397 acres; portion of SW. ¼ NW. ¼ sec. 7, containing 1.468 acres, more or less, and portion of NE. ¼ SW. ¼ and SE. ¼ NW. ¼ sec. 7, containing 4.169 acres; portion of SE. ¼ NW. ¼ and SW. ¼ NW. ¼ sec. 7, containing 1.206 acres; all in T. 49 N., R. 9 W., N. M. P. M.	1.00	May 12, 1914
Fisher, C. A	Portion of NW. ¼ NW. ¼ sec. 3, T. 50 N., R. 10 W., N. M. P. M., containing 0.96 acre, more or less.	1.00	Apr. 6, 1914
Foster, C. P., Foster, W. S., and Garroutte, J. B.	Portion of NW. ¼ SE. ¼ sec. 34, T. 51 N., R. 10 W., N. M. P. M., containing 0.64 acre, more or less.	1.00	Apr. 13, 1914
Fry, H. M., and Teda J	Water right consisting of ½ cubic foot per second of time in the Montrose & Delta Canal.	400.00	Oct. 30, 1913
Frush, F. M., and Rose M	Portion of NE. ¼ SE. ¼ sec. 6, T. 49 N., R. 9 W., N. M. P. M., containing 2.64 acres, more or less.	300.00	June 8, 1914
Fuerstenberg, Henry	Portion of NE. ¼ SW. ¼ sec. 6, T. 49 N., R. 9 W., N. M. P. M., containing 0.11 acre, more or less.	1.00	Mar. 6, 1914
Garnet Ditch & Reservoir Co.	The Garnet Canal system (the consideration is to be paid in the form of a credit on the building charges, and has not yet actually been paid).	18,179.00	Mar. 12, 1914
Garnet Land & Improvement Co., the.	Portion of SW. ¼ NE. ¼ and NW. ¼ NE. ¼, sec. 34. T. 51 N., R. 10 W., N. M. P. M., containing 0.77 acre, more or less.	1.00	Apr. 11, 1914
Gish, George F., and Trumbull, Thomas B.	Portion of S. ½ SE. ¼ NW. ¼, sec. 10, T. 50 N., R. 10 W., N. M. P. M., containing 1.56 acres, more or less.	225.00	June 5, 1913
Griffin, George E	Portion of SW. ¼ NW. ¼, sec. 20, T. 15 S., R. 96 W., 6th P. M., containing 0.552 acre, more or less.	1.00	May 21, 1914
Grosvenor, A. S. and M. J	Portion of NE. ¼ SE. ¼, sec. 34, T. 51 N., R. 10 W., N. M. P. M., containing 0.645 acre, more or less.	1.00	Apr. 20, 1914
Harvey, Joseph	Portion of lot 2, sec. 9, T. 51 N., R. 11 W., N. M. P. M., containing 0.28 acre more or less.	50.00	July 5, 1913
Heath, Fred W., and Pelton, John E.	Portion of S. ½ SW. ¼, sec. 12, and SE. ¼ SE. ¼, sec. 11, T. 48 N., R. 10 W., N. M. P. M., containing 11.46 acres, more or less.	150.00	Nov. 15, 1912
Hight, C. W	Portion of SE. ¼ NW. ¼, sec. 33, T. 15 S., R. 95 W., 6th P. M., containing 0.115 acre, more or less.	1.00	June 20, 1914
Hodge, Maude M	Portion of SE. ¼ SE. ¼, sec. 1, T. 49 N., R. 10 W., N. M. P. M., containing 2.441 acres, more or less.	1.00	May 9, 1914
Hovey, Frank L	Portion of NW. ¼ SW. ¼, sec. 7, T. 49 N., R. 9 W., N. M. P. M., containing 0.141 acre, more or less.	1.00	May 12, 1914
Hunter, William H	Portion of SW. ¼ NW. ¼, sec. 2, containing 0.85 acre; portion of SW. ¼ NW. ¼, sec. 2, containing 0.563 acre; all in T. 50 N., R. 10 W., N. M. P. M.; portion of SE. ¼ NE. ¼, sec. 34, T. 51 N., R. 10 W., N. M. P. M., containing 0.145 acre.	1.00	Mar. 31, 1914
Jones, William H	Portion of SE. ¼ SE. ¼, SW. ¼ SE. ¼, and NW. ¼ SE. ¼, sec. 34, T. 15 S., R. 96 W., 6th P. M., containing 4.63 acres, more or less.	100.00	Aug. 5, 1913
Lippert, Charles J	Portion of SW. ¼ NE. ¼, sec. 27, T. 15 S., R. 96 W., 6th P. M., containing 0.68 acre, more or less.	1.00	Apr. 15, 1914
Maffenbeir, Frank	Two parcels of land in the NW. ¼ SE. ¼, sec. 6, T. 49 N., R. 9 W., N. M. P. M., containing a total of 2.544 acres, more or less.	300.00	June 18, 1914

Purchases of rights and property—Continued.

COLORADO, UNCOMPAHGRE PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Miller, Clyde W	Portion of NE. ¼ SW. ¼, NW. ¼ SE. ¼, and SW. ¼ SE. ¼, sec. 24, containing 14.91 acres; portion of E. ½ NW. ¼ NE. ¼, sec. 25, containing 0.32 acre; portion of E. ½ NW. ¼ NE. ¼, sec. 25, containing 2.40 acres; portion of lot 7, sec. 25, containing 2.43 acres; portion of lot 2, sec. 36, containing 6.18 acres; all in T. 48 N., R. 9 W., N. M. P. M.	421.50	Mar. 27, 1914
Naftel, John F	Portion of SW. ¼ NE. ¼, sec. 6, T. 49 N., R. 9 W., N. M. P. M., containing 0.01 acre, more or less.	1.00	Feb. 17, 1914
Do	Portion of W. ½ NW. ¼, sec. 5, T. 49 N., R. 9 W., N. M. P. M., containing 3.85 acres, more or less.	500.00	June 12, 1914
O'Neill, James and Jesse	Portion of SW. ¼ SE. ¼, sec. 23, containing 0.17 acre; portion of SW. ¼ SE. ¼, sec. 23, containing 0.70 acre; portion of NE. ¼ SW. ¼, sec. 23, containing 2.08 acres; portion of NW. ¼ SW. ¼ and SW. ¼ NW. ¼, sec. 23, containing 1.92 acres; all in T. 49 N., R. 10 W., N.M.P.M.	1,000.00	Sept. 8, 1913
Obergfell, Joseph D. and Philip A.	Portion of NE. ¼ SE. ¼, sec. 20, T. 15 S., R. 96 W., 6th P. M., containing 1.02 acres, more or less.	1.00	May 14, 1914
Perkins, H. E	Portion of SE. ¼ NE. ¼ and NE. ¼ NE. ¼, sec. 3, containing 0.60 acre; portion of NE. ¼ NE. ¼ and NW. ¼ NE. ¼, sec. 3, containing 1.36 acres; all in T. 50 N., R. 10 W., N. M. P. M.	1.00	Apr. 13, 1914
Picker, Christian H. B	Portion of SE. ¼ NW. ¼, sec. 15, T. 50 N., R. 10 W., N. M. P. M., containing 1.97 acres, more or less.	200.00	Aug. 8, 1913
Picker, Christian H. B., and C. C. Rhodes.	Portion of SE. ¼ NW. ¼, sec. 15, T. 50 N., R. 10 W., N. M. P. M., containing 0.96 acre, more or less.	150.00	Do.
Ratcliff, A. G	Portion of NE. ¼ NE. ¼, sec. 12, containing 4.927 acres; portion of NE. ¼ NE. ¼, sec. 12, containing 0.222 acre; all in T. 49 N., R. 10 W., N. M. P. M.; also portion of NW. ¼ NW. ¼, sec. 7, T. 49 N., R. 9 W., N. M. P. M., containing 0.316 acre, more or less.	1.00	June 20, 1914
Reeves, A. F	Portion of E. ½ SE. ¼, sec. 20, T. 49 N., R. 10 W., N. M. P. M., containing 3.17 acres, more or less.	1.00	Feb. 4, 1913
Do	Portion of NW. ¼ SW. ¼, sec. 21, T. 49 N., R. 10 W., N. M. P. M., containing 2.19 acres, more or less.	350.00	Oct. 20, 1913
Smith, G. M	Portion of SE. ¼ SE. ¼, sec. 34, containing 0.531 acre; portion of SE. ¼ SE. ¼, sec. 34, containing 0.007 acre; portion of SW. ¼ SE. ¼, sec. 34, containing 0.662 acre; all in T. 51 N., R. 10 W., N. M. P. M.	1.00	Apr. 13, 1914
Townsend, Thomas B	Portion of NE. ¼ NW. ¼, sec. 10, T. 50 N., R. 10 W., N. M. P. M., containing 3.69 acres, more or less.	369.00	May 10, 1913
Townsend, T. B	Portion of SW. ¼ SW. ¼, sec. 34, containing 0.79 acre; portion of SW. ¼ NW. ¼, sec. 34, containing 0.51 acre; all in T. 51 N., R. 10 W., N. M. P. M.	1.00	Mar. 20, 1914
Ure, J. E	Portion of SE. ¼ SW. ¼, sec. 22, and NE. ¼ NW. ¼, sec. 27, containing 0.51 acre; portion of SE. ¼ SW. ¼, sec. 22, containing 0.135 acre; all in T. 15 S., R. 96 W., 6th P. M.	1.00	Apr. 15, 1914

IDAHO, BOISE PROJECT.

Amos, Geo	Parcel of land containing 1.38 acres in the E. ½ NE. ¼ sec. 27, T. 3 N., R. 1 E., B. M.	$138.00	Aug. 22, 1912
Bissett, Ada E., and Allen Bissett.	A strip of land 70 feet wide in SE. ¼ NE. ¼ sec. 15, T. 3 N., R. 2 W., containing 1.99 acres.	1.00	June 4, 1914
Bond, Minnie E., and husband.	Portion of NE. ¼ SW. ¼ sec. 26, T. 3 N., R. 1 E., B. M., 4 acres.	150.00	Dec. 19, 1912
Day, William and Maria L	Portion of SW. ¼ NW. ¼ sec. 11, T. 3 N., R. 1 W., containing 1.6 acres.	275.00	Oct. 21, 1909
Eck, L. E	Portion of NE. ¼ sec. 27, T. 3 N., R. 1 E., B. M., and portion of W. ½ SW. ¼ sec. 27, T. 3 N., R. 1 E., B. M.	400.00 320.00	June 10, 1910 Do.
Foser, Herman	A strip of land in W. ½ NE. ¼ sec. 15, T. 3 N., R. 2 W., containing 1.65 acres.	1.00	June 3, 1914
Hudson, L. L	Tract of land of 3.48 acres in N. ½ NW. ¼ NW. ¼ NW. ¼ sec. 23, T. 4 N., R. 5 W., B. M., less strip 100 feet wide along entire length of north side of above entry.	696.00	Feb. 17, 1914

Purchases of rights and property—Continued.

IDAHO, BOISE PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Kempthorne, C. W	Damage to improvements on E. ½ SW. ¼ sec. 32, T. 3 N., R. 2 W., B. M.	75.00	Aug. 25, 1913
Lamphere, H. F	Portion of W. ½ NW. ¼ sec. 17, T. 3 N., R. 2 W., being a strip 115 feet wide, containing 3.69 acres.	1.00	May 28, 1914
Munson, E. W	Damages to improvements on farm unit E in SE. ¼ SW. ¼ sec. 32, T. 5 N., R. 5 W., B. M.	102.50	Nov. 25, 1912
Percy, Alfred, and wife	Right of way for power line across E. ½ SW. ¼ and part of SE. ¼ sec. 20, T. 3 N., R. 4 E.	100.00	Dec. 22, 1911
Stark, Celia and S. H	Damage to improvements in SE. ¼ SW. ¼ sec. 11, and E. ½ NW. ¼ sec. 14, T. 4 N., R. 6 W.	1,000.00	May 1, 1914
Verheyen, Chas	NW. ¼ NE. ¼ sec. 15, T. 3 N., R. 2 W., containing 1.37 acres.	1.00	June 1, 1914
Walling, Georgia M., Benjamin F. Walling, and J. H. Cowell.	SW. ¼ NE. ¼ sec. 15, T. 3 N., R. 2 W., containing 0.88 acre, and NW. ¼ SE. ¼, same twp. and range, 2.26 acres.	1.00	June 4, 1914

IDAHO, MINIDOKA PROJECT.

Banta, Herbert H., et al	Purchase of lateral No. 37, secs. 19 and 20, T. 9 S., R. 25 E.	$81.40	May 29, 1914
Begey, Francis G	Purchase of lateral No. 34–D–4, in sec. 16, T. 9 S., R. 25 E., B. M.	61.10	Feb. 17, 1914
Benson, Arthur	Purchase of lateral 210–2, in sec. 7, T. 9 S., R. 25 E., B. M., and secs. 5 and 8.	298.64	July 15, 1913
Benson, B. F	Purchase of portion of lateral 210–2, in secs. 7, 5, and 8, T. 9 S., R. 25 E., B. M.	248.25	July 1, 1913
Blincoe, Daisy P	Payment for damages to improvements on farm unit E in sec. 8, T. 10 S., R. 23 E., B. M.	26.50	Aug. 12, 1913
Bradley, Bessie E	Payment for damages to improvements on farm unit F in sec. 4, T. 10 S., R. 23 E., B. M.	50.00	July 19, 1913
Brogan, Daniel	Purchase of lateral 213 in sec. 12, T. 9 S., R. 24 E., B. M.	65.00	July 16, 1913
Brookman, Edward A	Payment for damages to improvements on farm unit A in sec. 35, T. 9 S., R. 22 E., B. M.	26.00	Nov. 1, 1913
Burrage, Van A	Payment for damages to improvements on farm unit E in sec. 2, T. 10 S., R. 22 E., B. M.	39.00	July 1, 1913
Congleston, Byron O., and Henry Grimm.	Purchase of CW–2 lateral in sec. 31, T. 9 S., R. 23 E., B. M.	13.76	Aug. 8, 1913
Daniels, Albert F., and Fredrick A. Tattersall.	Purchase of lateral 313–2 in sec. 14, T. 10 S., R. 24 E., B. M.	123.25	Feb. 17, 1914
Downard, James A., and Walter J. McGarraugh.	Purchase of lateral 312 in secs. 11 and 12, T. 10 S., R. 24 E., B. M.	123.00	Dec. 6, 1913
Eipper, Elmer, et al	Purchase of lateral 430 in secs. 13 and 14, T. 10 S., R. 23 E., B. M.	19.70	Feb. 21, 1914
Elsea, Josie Acuff	Damage to improvement, farm unit H, in W. ½ SW. ¼ sec. 15, T. 9 S., R. 23 E.	18.00	June 12, 1914
Emigh, Roy	Portion of E. ½ NE. ¼ and NE. ¼ SE. ¼ sec. 36, T. 9 S., R. 27 E., containing 56.5 acres.	1,977.50	Nov. 28, 1913
Farabee, Irvin L	Damage to improvements, farm unit E, or N. ½ SW. ¼ sec. 8, T. 9 S., R. 24 E.	24.00	May 25, 1914
Ford, John R	Payment for damages to improvements on farm unit H in sec. 26, T. 9 S., R. 22 E., B. M.	70.00	July 1, 1913
Frank, Richard E	Purchase of lateral branch No. 129, sec. 12, T. 9 S., R. 23 E.	49.60	May 7, 1914
Glick, Albert C., et al	Purchase of lateral 178 in sec. 24, T. 9 S., R. 22 E., B. M.	243.80	Jan. 5, 1914
Grimm, E. C	Purchase of Daley branch of lateral 1522 in sec. 36, T. 9 S., R. 22 E., B. M.	30.10	Jan. 14, 1914
Do	Payment for damages to improvements on farm unit C, sec. 34, T. 9 S., R. 22 E., B. M.	16.00	Nov. 1, 1913
Grisenti, Mansueto, and Percy A. Rutledge.	Purchase of lateral 33 in secs. 10 and 11, T. 9 S., R. 25 E., B. M.	38.72	Feb. 17, 1914
Isbell, J. Walter	Purchase of lateral 174–1 in sec. 19, T. 9 S., R. 23 E., B. M.	88.90	Do.
Do	Purchase of lateral 177 in sec. 19, T. 9. S., R. 23 E., B. M.	40.00	Do.
Langlois, D. R	Purchase of portion of lateral 210–2 in secs. 5, 7, and 8, T. 9 S., R. 25 E., B. M.	237.68	July 31, 1913
Lipps, Carl J	Damages to improvements, farm unit T, E. ½ NE. ¼, NE ¼ E. ½, E. ½ W. ½, NE. ¼ NE. ¼ sec. 30, T. 9 S., R. 24 E.	4.50	May 25, 1914
Long, Patrick H	Damages to improvements, farm unit H, SE. ¼ NE. ¼ sec. 12, T. 9. S., R. 24 E.	23.50	June 5, 1914
Lovin, R. N., et al	Purchase of lateral 24 in sec. 34, T. 8 S., R. 25 E., B. M.	499.88	Nov. 17, 1913
Lowry, N. C	Damages to improvements, farm unit F, NE. ¼ SW. ¼ sec. 11, T. 10 S., R. 23 E.	18.00	May 25, 1914

Purchases of rights and property—Continued.

IDAHO, MINIDOKA PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Markland, Forrest	Damages to improvements, farm unit C, S. ½ NW. ¼ sec. 13, T. 9 S., R. 24 E.	76.00	Apr. 18, 1914
Moncur, Harve	Damages to improvements, farm unit C, N. ½ NW. ¼ sec. 12, T. 10 S., 22 E.	32.00	May 25, 1914
McKenzie, Neil	Purchase of lateral 37 FE1, sec. 19, T. 9 S., R. 25 E.	22.80	May 9, 1914
Do	Purchase of lateral No. 38, secs. 19, 20, and 30, T. 9 S., R. 25 E.	83.38	Do.
Olsen, Tolger	Purchase of lateral 1813 in sec. 17, T. 10 S., R. 23 E., B. M.	6.50	Jan. 31, 1914
Parken, Walter	Payment for damages to improvements on farm unit B, sec. 35, T. 9 S., R. 22 E., B. M.	21.00	July 1, 1913
Parker, Ida O	Purchase of lateral 135–4, sec. 16, T. 9 S., R. 24 E.	19.90	May 22, 1914
Phillips, H. A	Purchase of lateral 421 in sec. 5, T. 10 S., R. 24 E., B. M.	105.20	Feb. 17, 1914
Rogers, H. S	Purchase of lateral 1745 in sec. 25, T. 9 S., R. 22 E., B. M.	12.80	Do.
Ryberg, Andrew, and N. Secor Hyatt.	Purchase of lateral A1 C2 in secs. 14 and 23, T. 9 S., R. 24 E., B. M.	154.00	July 16, 1913
St. Clair, Louisa	Payment for damages to improvements on farm unit D in sec. 14, T. 10 S., R. 23 E., B. M.	113.00	Nov. 24, 1913
Sartain, Joel E., and W. Herbert.	Purchase of lateral 96–2 in sec. 19, T. 10 S., R. 24 E., B. M.	66.50	Feb. 17, 1914
Sartain, W. Herbert	Damages to improvements, farm unit G, S. ½ SE. ¼ sec. 19, T. 10 S., R. 24 E.	17.50	June 10, 1914
Scott, Earl G	Purchase of lateral, Scott branch of No. 430 in sec. 14, T. 10 S., R. 23 E., B. M.	54.50	Feb. 17, 1914
Sheehan, Delia E	Purchase of portion of lateral 418 in secs. 27 and 34, T. 9 S., R. 24 E., B. M.	13.80	Sept. 16, 1913
Smith, Henry Z	Damages to improvements, farm unit J, NE. ¼ SE. ¼ sec. 7, T. 9 S., R. 24 E.	50.00	June 10, 1914
Snyder, Matilda C	Damages to improvements, farm unit C, SE. ¼ SE. ¼ sec. 11, T. 9 S., R. 24 E.	10.00	Do.
Spencer, Ira A	Damages to improvements, farm unit G, lot 3, NE. ¼ SW. ¼ sec. 18, T. 10 S., R. 24 E.	5.50	June 11, 1914
Sullivan, Geo. A	Purchase of portion of sublateral 210–2 in secs. 5, 7, and 8, T. 9 S., R. 25 E., B. M.	129.66	July 3, 1913
Thomas, Matt	Purchase of lateral 59 in sec. 25, T. 9 S., R. 24 E., B. M.	45.00	Feb. 4, 1914
Tout, Neville S	Payment for damage to improvements on farm unit H, sec. 35, T. 9 S., R. 22 E., B. M.	20.00	July 1, 1913
Village of Burley	Lot 11, block 122, Burley town site	1.00	Sept. 26, 1913
Wakewood, John	Purchase of lateral 1315–1 in sec. 11, T. 9 S., R. 23 E., B. M.	30.00	Feb. 17, 1914
Whittle, Thomas L	Purchase of lateral 115–6 in secs. 25 and 36, T. 8 S., R. 24 E., B. M.	81.00	Do.
Whitson, Geo. L	Damages to improvements, farm unit F, W. ½ SE. ¼ sec. 2, T. 10 S., R. 22 E.	14.00	May 22, 1914

MONTANA, FLATHEAD PROJECT.

Bell, Orson	Damages to improvements on W. ½ SW. ¼ sec. 21, T. 22 N., R. 20 W.	$267.90	
Dupuis, Joseph O., heirs of	Damages to improvements on N. ½ SW. ¼ sec. 18, T. 22 N., R. 19 W.	474.15	
Finley, Alex	Damages to improvements on N. ½ NE. ¼ sec. 30, T. 20 N., R. 19 W.	23.98	
Finley, Antoine	Damages to improvements on S. ½ NE. ¼ sec. 30, T. 20 N., R. 19 W.	26.62	
Finley, Joseph	Damages to improvements on S. ½ SE. ¼ sec. 30, T. 20 N., R. 19 W.	5.72	
Finley, Philomene	Damages to improvements on N. ½ SE. ¼ sec. 30, T. 20 N., R. 19 W.	26.62	
Hanson (née Glover), Lily B.	Damages to improvements on E. ½ NE. ¼ sec. 20, T. 22 N., R. 20 W.	171.80	
Incashola, Joseph	Damages to improvements on E. ½ SE. ¼ sec. 8, T. 20 N., R. 20 W.	40.00	
Matt, Maxine	Damages to improvements on SW. ¼ NW. ¼ and NW. ¼ SW. ¼ sec. 17, and NE. ¼ SE. ¼ sec. 18, T. 24 N., R. 23 W.	113.67	
Mollman, Charles	Damages to improvements on E. ½ SW. ¼ sec. 21, T. 20 N., R. 19 W.	102.33	
Plant, Anthony August	Damages to improvements on NW. ¼ NW. ¼ N. ½ SW. ¼ NW. ¼ sec. 21, T. 20 N., R. 19 W. NOTE.—The above amounts were paid in accordance with report of board of appraisers Dec. 2, 1913, approved by the Secretary of the Interior Feb. 13, 1914.	11.02	

Purchases of rights and property—Continued.

MONTANA, FLATHEAD PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Dukes, Stephen	Damages to improvements on SW. ¼ NW. ¼ and NW. ¼ SW. ¼ sec. 14, T. 20 N., R. 21 W.	50.00	Dec. 16, 1913
Hudson, A. H	Damages to improvements on SE. ¼ NE. ¼, NE. ¼ SE. ¼ sec. 34, T. 22 N., R. 21 W.	20.00	Apr. 10, 1914
Lozeau, Louie	Damages to improvements on allotment No. 750, in sec. 15, T. 20 N., R. 21 W.	650.00	Oct. 11, 1913
Snyder, David S	Damages to improvements on SE. ¼ SE. ¼ sec. 18, T. 19 N., R. 21 W.	59.00	Mar. 25, 1914

MONTANA, MILK RIVER PROJECT.

Barnes, Lyman, and wife	Improvements on strip of land in S. ½ SW. ¼ sec. 24, N. ½ NW. ¼ sec. 26, T. 30 N., R. 29 E., M. P. M.	$270.00	June 7, 1913
Clement, Preston S., and wife	Lot 1, sec. 10, lots 2, 3, 5, and NW. ¼ NW. ¼ sec. 11, T. 30 N., R. 36 E., M. P. M., 163.62 acres.	2,945.16	May 12, 1914
Czyzewski, Walter	Improvements on strip of land in SE. ¼ SE. ¼ sec. 34, and SW. ¼ SW. ¼ sec. 35, T. 28 N., R. 40 E., M. P. M.	51.60	Mar. 14, 1914
Cone, Elizabeth	50 acres in secs. 15 and 22 and right of way over 3.7 acres in sec. 22, T. 30 N., R. 30 E., M. P. M.	1,290.00	Feb. 9, 1914
Cygen, John	Improvements on strip of land in NW. ¼ SE. ¼ sec. 4, T. 27 N., R. 40 E., M. P. M.	150.00	Mar. 14, 1914
Foote, Cleo A., and wife	Improvements on strip of land in lots 1, 2, 3, and 4, sec. 6, T. 28 N., R. 39 E., M. P. M.	100.00	June 10, 1913
Howerton, R. J., and wife	13.45 acres in secs. 15 and 22, T. 30 N., R. 30 E., M. P. M.	270.00	Jan. 26, 1914
Lusk, William B., and wife	5.48 acres in lots 6 and 13, sec. 14, T. 30 N., R. 27 E., M.P.M.	82.20	Sept. 6, 1913
Madison, John M., and wife	Improvements on strip of land in SW. ¼ SW. ¼ sec. 23, S. ½ NW. ¼ and SE. ¼ NW. ¼ sec. 26, T. 28 N., R. 39 E., M.P.M.	56.00	June 9, 1913
Motzkau, Arthur A., and wife	Improvements on strip of land in E. ½ NE. ¼, E. ½ SE. ¼, sec. 6, T. 29 N., R. 38 E., M.P.M.	460.00	June 19, 1913
Northwestern Ranch Co	23.67 acres in sec. 1, T. 30 N., R. 36 E., M.P.M.	946.80	July 24, 1913
Newport, Chris B., and wife	Improvements on strip of land in NW. ¼ NE. ¼ sec. 22, and W. ½ NW. ¼ and NW. ¼ SW. ¼ sec. 23, T. 28 N., R. 39 E., M.P.M.	69.50	June 10, 1913
O'Riley, Thomas B., and wife	Improvements on strip of land in sec. 7, T. 30 N., R. 29 E., M.P.M.	22.00	July 7, 1913
O'Riley, Thomas B., jr	Improvements on strip of land in SW. ¼ SE. ¼ and E. ½ SE. ¼ sec. 3, and lot 3, sec. 18, T. 30 N., R. 29 E., M.P.M.	55.00	Do.
Rutter, John H., and wife	24.75 acres in secs. 2 and 11, T. 30 N., R. 36 E., M.P.M.	990.00	Oct. 7, 1913
Smith, Mary, and husband	Easement for flowage over lots 9 and 10, sec. 33, lot 2, sec. 34, T. 31 N., R. 36 E., lots 2, 3, and 4, sec. 4, T. 30 N., R. 36 E., M.P.M.	362.00	Nov. 25, 1912
Survant, John, and wife	Easement for flowage over S. ½ NW. ¼, N. ½ SW. ¼ sec. 28, lots 3, 8, 10, 12, S. ½ NW. ¼ sec. 32, T. 31 N., R. 36 E., M.P.M.	106.82	Aug. 8, 1912
Terhark, Henry, and wife	Improvements on strip of land in NE. ¼ SW. ¼ and lots 5, 6, 8, and 10, sec. 30, T. 30 N., R. 38 E., M. P. M.	100.00	June 9, 1913
Valley Ranch Co	18.30 acres in sec. 2, T. 30 N., R. 36 E., M. P. M.	732.00	Sept. 30, 1913
Vogel, Herman, and wife	Relinquishment of lots 1, 10, and NE. ¼ NE. ¼ sec. 12, T. 30 N., R. 36 E., and lots 1, 2, and 8, sec. 7, T. 30 N., R. 37 E., M. P. M., 159.01 acres.	6,500.00	Sept. 11, 1913

MONTANA, SUN RIVER PROJECT.

Floweree Sheep & Horse Co	Additional flowage lands for Willow Creek Reservoir, SW. ¼ NE. ¼ sec. 30, T. 21 N., R. 6 W., M. P. M.	$600.00	Feb. 24, 1914
Do	For camp site: 5.14 acres in SW. ¼ SE. ¼ sec. 4, T. 21 N., R. 4 W., M. P. M.	128.50	Do.
Henningsen Land Co	For camp site: 1.49 acres in SW. ¼ NW. ¼ sec. 4, T. 21 N., R. 6 W., M. P. M.	55.00	May 27, 1914

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

Elkins, C. E	Relinquishment, lot 2, sec. 18, T. 24 N., R. 60 E.	$66.75	
Groskinsky, Albert	2.43 acres in SW. ¼ NW. ¼ sec. 3, T. 22 N., R. 59 E.	80.19	Oct. 24, 1913
Hardy, M. A	Rights through SW. ¼ sec. 3, T. 22 N., R. 59 E.	391.50	[1]
Kenoyer, E. A	3.71 acres in sec. 33, T. 23 N., R. 59 E	37.10	Dec. 16, 1913
Robinson, T. O. and L. A	3.36 acres in N. ½ SE. ¼ sec. 3, T. 22 N., R. 59 E.	164.00	Jan. 29, 1914

[1] Condemnation.

Purchases of rights and property—Continued.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Jenkins, John A	Damage to improvements in lot 2, sec. 19, T. 23 N., R. 53 W.	$135.00	Dec. 10, 1913
Kilgore, John B., and wife	Damage to improvements on right of way, E. ½ SE. ¼ sec. 21 and N. ½ NE. ¼ NE. ¼ sec. 28, T. 22 N., R. 52 W.	75.00	May 23, 1913
Negus, James D	Flowage rights in secs. 5 and 6, T. 29 N., R. 85 W.	800.00	June 8, 1914
Smith, Anselmo B., Investment Co.	Right of way for drainage ditch in S. ½ NW. ¼ sec. 6, T. 22 N., R. 54 W.	1.00	Dec. 30, 1913
Whalon, Richard	2.87 acres in lot 5, sec. 11, T. 26 N., R. 65 W.	229.60	Nov. 10, 1913

NEVADA, TRUCKEE-CARSON PROJECT.

Central Pacific Railway Co. and United States Trust Co. of New York.	N. ½ SW. ¼ sec. 19, T. 20 N., R. 23 E., M. D. B. and M., 87.19 acres, for Truckee Dam site.	$108.99	Sept. 21, 1912
Do	N. ½ N. ½ SW. ¼ sec. 33, T. 19 N., R. 26 E., M. D. B. and M., 400 acres, for Lahontan Dam site.	500.00	Do.
Churchill Creamery (Inc.)	Easement for right of way across NW. ¼ sec. 8, T. 17 N., R. 29 E., M. D. B. and M., for H lateral.	1.00	Mar. 21, 1914
Coatney, Stephen J., and wife	Part of N. ½ NE. ¼ sec. 1, T. 18 N., R. 28 E., M. D. B. and M., 1.9 acres, for Fallon substation site.	76.00	Nov. 3, 1913
Davis, James T., and wife, and Huffacker, Anthony, and wife.	Easement for right of way across NE. ¼ sec. 8, T. 17 N., R. 29 E., M. D. B. and M., for H lateral.	1.00	Mar. 23, 1914
Douglass Island (Inc.)	Easement for right of way across SE. ¼ sec. 8, T. 17 N., R. 29 E., M. D. B. and M., for H lateral.	1.00	Mar. 19, 1914
Do	Easement for right of way across SW. ¼ sec. 32, T. 18 N., R. 29 E. and W. ½ sec. 5, T. 17 N., R. 29 E., M. D. B. and M., for H lateral.	1.00	Do.
Ferguson, J. F., and wife, and Verplank, C. W.	Easement for right of way across W. ½ SW. ¼ sec. 29, T. 18 N., R. 29 E., M. D. B. and M., for H lateral.	1.00	Do.
Ferguson, J. B., and wife	Easement for right of way across NW. ¼ SE. ¼ sec. 1, T. 18 N., R. 28 E., M. D. B. and M., for B1b lateral.	1.00	Mar. 25, 1914
Harmon, J. S., and wife, and Austin, F. A., and wife.	Part of SE. ¼ NE. ¼ sec. 14, T. 19 N., R. 30 E. M. D. B. and M., for S2 drain.	1.00	Mar. 20, 1914
Hibbard, Percy W	Easement for right of way across NW. ¼ NE. ¼ sec. 18, T. 17 N., R. 29 E., M. D. B. and M., for H7 and H7a laterals.	1.00	May 29, 1914
Hodges, J. S., and wife	Easement for right of way across S. ½ SE. ¼ sec. 8, T. 17 N., R. 29 E., M. D. B. and M., for H lateral.	1.00	Mar. 19, 1914
Kemp, W. D., and wife	Quitclaim of right in ditch across SW. ¼ NW. ¼, N. ½ SW. ¼, sec. 27, T. 19 N., R. 30 E., M. D. B. and M., for Winder lateral.	1.00	Oct. 14, 1913
Kinkead, Mary J	Easement for right of way across NE. ¼ SW. ¼ sec. 1, T. 18 N., R. 28 E., M. D. B. and M., for B1b lateral.	1.00	May 26, 1914
Lattin, Geo. W., and wife	Easement for right of way across W. ½ NW. ¼ sec. 32, T. 18 N., R. 29 E., M. D. B. and M., for H lateral.	1.00	Mar. 19, 1914
McKay, E. L	Easement for right of way across N. ½ SE. ¼ sec. 8, T. 17 N., R. 29 E., M. D. B. and M., for H lateral.	1.00	Mar. 24, 1914
Peters, Matilda A., and husband.	Easement for right of way across SW. ¼ SE. ¼ sec. 1, T. 18 N., R. 28 E., M. D. B. and M., for B1b lateral.	1.00	Mar. 25, 1914
Post, Roswell O., and Post, John R.	Easement for right of way across NW. ¼ NW. ¼, SW. ¼ NW. ¼, sec. 19, T. 18 N., R. 29 E., M. D. B. and M., for C4a lateral.	1.00	Apr. 16, 1914
Taylor, C. J	Quitclaim of right in ditch across SW. ¼ NW. ¼, N. ½ SW. ¼, sec. 27, T. 19 N., R. 30 E., M. D. B. and M., for Winder lateral.	1.00	Nov. 8, 1913
Winder, G. W	Quitclaim of right in ditch across SW. ¼ NW. ¼, N. ½ SW. ¼, sec. 27, T. 19 N., R. 30 E., M. D. B. and M., for Winder lateral.	1.00	Oct. 14, 1913

NORTH DAKOTA, NORTH DAKOTA PUMPING PROJECT.

Bruegger Mercantile Co	Lot 7, block 22, of Bruegger addition to city of Williston; also a parcel of land in city of Williston and in NE. ¼ SW. ¼, SE. ¼ NW. ¼, sec. 24, T. 154, R. 101 W., 5th P. M.; also a parcel of land, 0.05 acre, in city of Williston; in all 2.45 acres.	$287.50	June 30, 1913

Purchases of rights and property—Continued.

OREGON, UMATILLA PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Hunt, Mrs. L. G.	Part E. ½ NW. ¼ and NE. ¼ SW. ¼, sec. 33, T. 5 N., R. 28 E., W. M.	$80.00	Apr. 30, 1914
Maxwell Land & Irrigation Co.	Part SW. ¼ sec. 21, T. 5 N., R. 28 E., W. M.	10.50	May 23, 1914
Do.	Part NW. ¼ sec. 33, T. 5 N., R. 28 E., W. M.	647.40	Do.
Western Land & Irrigation Co.	Part NW. ¼ NW. ¼ sec. 33, T. 5 N., R. 28 E., W. M.	1.00	May 5, 1914
Do.	Part S. ½ SW. ¼ sec. 17, T. 5 N., R. 28 E., W. M.	1.00	Do.

OREGON-CALIFORNIA, KLAMATH PROJECT.

Adams, J. Frank	Part N. ½ SW. ¼, NW. ¼ SE. ¼, sec. 4, T. 41 S., R. 11 E., W. M.	$1.00	Mar. 26, 1914
Adams, Will W	Part NW. ¼ NE. ¼, S. ½ NE. ¼, sec. 7, T. 41 S., R. 11 E., W. M.	1.00	Aug. 14, 1913
Albright, William, et al	15.4 acres in lot 8, SW. ¼ NE. ¼, W. ½ SE. ¼, sec. 22; E. ½ W. ½ sec. 27; N. ½ NW. ¼ sec. 34; NE. ¼ NE. ¼ sec. 33; S. ½ SE. ¼ sec. 28, T. 39 S., R. 10 E., W. M.	1,175.00	Feb. 1, 1913
Ankeny, Cordelia L	Part S. ½ NW. ¼, N. ½ SW. ¼, sec. 24, T. 39 S., R. 9 E., W. M.	1.00	[1] Oct. 8, 1913
Cacka, John	Part lots 2 and 3 and NW. ¼ SE. ¼ sec. 7, T. 41 S., R. 12 E., W. M.	1.00	Sept. 5, 1913
Carlton, G. H	Part E. ½ SW. ¼ sec. 36, T. 40 S., R. 10 E., W. M.	1.00	Aug. 25, 1913
Dixon, James	Part SW. ¼ SW. ¼, sec. 24, SE. ¼ SE. ¼ sec. 23, T. 39 S., R. 9 E., W. M.	1.00	Nov. 26, 1913
Hoyt, H. H	Part NW. ¼ SE. ¼ sec. 4, T. 41 S., R. 11 E., W. M.	1.00	Mar. 26, 1914
Klamath Development Co.	Part SW. ¼ NW. ¼ SW. ¼, sec. 1, T. 41 S., R. 10 E., W. M.	1.00	[1] Aug. 18, 1913
Lakeside Co	Part. W. ½ NE. ¼, SE. ¼ SE. ¼, sec. 7, T. 41 S., R. 12 E., W. M.	1.00	Oct. 8, 1913
Little Klamath Water Ditch Co.	Part payment for irrigation ditch or canal in Klamath County, Oreg., extending from a point in sec. 15, T. 41 S., R. 10 E., W. M., to a point 174 feet south of the NW. corner sec. 10, T. 41 S., R. 11 W., W. M., commonly known as the Adams ditch or canal, together with water rights, rights of way, riparian rights, etc. Amount withheld under opinion of Assistant Attorney General, Sept. 19, 1906, now being paid under his opinion, Mar. 14, 1914.	5,000.00	Apr. 14, 1905
Mason, W. H	Part SW. ¼ SW. ¼, sec. 27, SW. ¼ NE. ¼, sec. 22, T. 39 S., R. 9 E., W. M.	72.00	Apr. 6, 1914
Do	Part NW. ¼ NW. ¼, sec. 27, SW. ¼ SW. ¼, sec. 22, SW. ¼ NW. ¼, sec. 27, T. 39 S., R. 9 E., W. M.	1.00	Do.
Melhase, Fred	Part SW. ¼ SW. ¼ sec. 21, T. 39 S., R. 9 E., W. M.	1.00	Aug. 2, 1913
Parrish, H. S	Part S. ½ SW. ¼ NW. ¼ sec. 36, T. 40 S., R. 10 E., W. M.	1.00	Aug. 25, 1913
Swan, John G	Part N. ½ SW. ¼ NW. ¼ sec. 36, T. 40 S., R. 10 E., W. M.; SE. ¼ NW ¼, T. 40 S., R. 10 E., W. M.	1.00	Do.
Tolle, H. F	Part NW. ¼ NE. ¼ sec. 36, T. 40 S., R. 10 E., W. M.	1.00	Mar. 17, 1914
Do	Part N. ½ NE. ¼ sec. 36, T. 40 S., R. 10 E., W. M.	1.00	Do.
Whitlatch, W. W	Part SW. ¼ NW. ¼, NW. ¼ SW. ¼, and lot 4, sec. 8, T. 41 S., R. 11 E., W. M.	1.00	Aug. 19, 1913
Wilson, C. T	Part lot 2, sec. 12, T. 41 S., R. 10 E., W. M.	1.00	Apr. 10, 1914

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

Richards, Ella A., and husband.	Part of SE. ¼ NE. ¼ sec. 20, T. 8 N., R. 6 E., B. H. M.	$50.00	Feb. 18, 1914
Rosander, Andrew E., executor.	Lots 7 to 12, inclusive, in block 23 of the town of Vale, S. Dak.; area, 1.48 acres.	210.00	July 17, 1913
Stearns, H. M., and wife	Strip 16 feet wide by 35.3 feet long across SW. ¼ NE. ¼ sec. 12, T. 8 N., R. 3 E., B. H. M.	[2]	Nov. 4, 1913

[1] Easement. [2] Mutual benefits.

Purchases of rights and property—Continued.

WASHINGTON, OKANOGAN PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
McDaniel, Wm., and wife	Part of lot 8, sec. 6, and parts of lots 5, 6, 7, and 8, sec. 5, T. 35 N., R. 25 E., W. M., 6.13 acres.	$515.60	Jan. 26, 1914

WASHINGTON, YAKIMA PROJECT.

Andress, Clark, and wife	Defining right of way, Rocky Ford lateral over part SE. ¼ SE. ¼, sec. 22, T. 9 N., R. 23 E., W. M.	$18.00	Apr. 29, 1913
Cascade Lumber Co	NW. ¼ sec. 8, T. 21 N., R. 14 E., W. M	3,369.25	May 18, 1914
Durr, Chas. E., and wife	Right of way for telephone line over part SE. ¼ SE. ¼, sec. 25, T. 10 N., R. 20 E., W. M.	21.00	Feb. 6, 1914
Eastman, Hiram, and wife	Right of way Rocky Ford lateral over part sec. 23, T. 9 N., R. 23 E., W. M.	15.00	Apr. 29, 1913
Flanagan Mining Co	Improvements on certain mining claims bordering Keechelus Reservoir.	3,000.00	Mar. 24, 1913
Gnavauch, Fred, and wife	100-foot strip for spillway, right of way, sec. 8, T. 14 N., R. 16 E., W. M.	225.00	Feb. 27, 1914
Hastings, H. H. A., administrator, estate Geo. W. Dunlap.	Irregular strip in S. ½ S. ½, SW. ¼ NW. ¼, sec 13, T. 9 N., R. 23 E., W. M.	40.80	Apr. 25, 1914
Kuydendall, Martha	Defining right of way Ryder lateral over NW. ¼ sec. 22, T. 9 N., R. 23 E., W. M.	35.00	Apr. 29, 1913
Macy, Roy, and wife	25-foot strip over N. ½ NE. ¼ sec. 25, T. 11 N., R. 20 E., W. M.	249.00	Jan. 30, 1914
Moore, Josiah W., and wife	Defining right of way Ryder lateral over tracts 143 and 144, Grandview orchard tracts.	18.00	July 3, 1913
Northwestern Improvement Co.	210-foot strip over E. ½ sec. 3, T. 20 N., R. 13 E., W. M.	91.00	Apr. 23, 1914
Probach, M., widower	Easement over 135-foot strip across NW. ¼ SW. ¼ sec. 13, T. 9 N., R. 22 E., W. M.	.....	June 2, 1914
Turner, E. G., and wife	Defining right of way Ryder lateral over SW. ¼ NW. ¼ NW. ¼, sec. 21, T. 9 N., R. 23 E., W. M.	50.00	Mar. 18, 1913
Washington Irrigation Co	Defining right of way Sunnyside Main Canal over N. ½ SW. ¼ sec. 2, T. 9 N., R. 23 E., W. M.	.....	June 17, 1913
Do	Defining right of way Sunnyside Main Canal over N. ½ SE. ¼ sec. 8, T. 10 N., R. 22 E., W. M.	.....	Do.
Do	Defining right of way Sunnyside Main Canal over E. ½ NE. ¼ sec. 14, T. 9 N., R. 23 E., W. M.	.....	Do.
Do	Defining right of way Sunnyside Main Canal over E. ½ SE. ¼ sec. 28, T. 9 N., R. 24 E., W. M.	.....	Do.
Do	Defining right of way Sunnyside Main Canal over E. ½ SE. ¼ sec. 24, T. 9 N., R. 23 E., W. M.	.....	Do.
Do	Defining right of way Snnnyside Main Canal over NW. ¼ SE. ¼ sec. 24, T. 9 N., R. 23 E., W. M.	.....	Do.
Do	Defining right of way Snipes Mountain lateral over SE. ¼ SW. ¼ SW. ¼ sec. 35, T. 10 N., R. 22 E., W. M.	.....	Sept. 2, 1913
Do	0.66 acre in SW. ¼ NW. ¼ NW. ¼ NW. ¼ SW. ¼ sec. 33, and 0.21 acre in SW. ¼ NE. ¼ NW. ¼ sec. 31, T. 11 N., R. 21 E., W. M.	170.00	Nov. 22, 1911
White, Anson S., and wife	80-foot strip over N. ½ NE. ¼ sec. 5, T. 13 N., R. 17 E., W. M.	150.00	Mar. 31, 1914

WYOMING, SHOSHONE PROJECT.

Estate of Thomas S. Trimmer, deceased.	N. ½ SE. ¼ and N. ½ SW. ¼ sec. 10, T. 52 N., R. 103 W.	$3,000.00	Apr. 16, 1913

PRINCIPAL CURRENT CONTRACTS.

In the following tables are shown, by projects, data relative to the principal contracts in operation or completed during the fiscal year ending June 30, 1914:

Principal current contracts.

ARIZONA, SALT RIVER PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1914.	Completion due.
	Oct. 7, 1913	H. M. Lewis	Excavation and concrete structures.	$2,026.54	[1] $2,026.54	Dec. 6, 1913
	Oct. 27, 1913	do	Installation of concrete structure.	4,734.83	[1] 4,734.83	
362	Apr. 6, 1911	S. Morgan Smith	Water wheels	18,100.00	[1] 18,100.00	Dec. 17, 1911
484	Jan. 30, 1913	J. A. Roebling's Sons Co.	Wire	7,206.10	[1] 7,206.10	Apr. 19, 1913
485	Jan. 31, 1913	Chicago Steel Products Co.	Tower tops	22,569.00	[1] 21,650.13	May 5, 1913
486	Feb. 3, 1913	Pierson, Roeding & Co.	Insulator chains	10,160.00		May 1, 1913

CALIFORNIA, ORLAND PROJECT.

518	Nov. 18, 1913	Philip Schuyler	Earthwork, East Park feed canal.	$53,130.00	$25,204.40	Nov. 1, 1914
546	May 29, 1914	M. Fisher	Diversion dam and structures, East Park feed canal.	46,388.20		Nov. 15, 1914
561	June 12, 1914	W. H. Mason	Earthwork, distribution system.	19,822.50	1,928.50	Dec. 1, 1914

COLORADO, GRAND VALLEY PROJECT.

500	June 28, 1913	Reynolds Ely Construction Co.	Earthwork, Canyon division Main Canal.	$109,568.00	$110,815.44	Sept. 30, 1914
516	Nov. 6, 1913	Hinman Hydraulic Manufacturing Co.	Regulator gates for dam.	6,079.00	[1] 6,079.00	Dec. 31, 1913

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

483	Jan. 29, 1913	John Palmgren and copartners.	West Canal extension.	$11,390.00	[1] $11,222.42	Aug. 1, 1913
492	May 10, 1913	Sayler Construction Co.	Canal excavation	72,930.00	[1] 95,379.79	Mar. 1, 1914
[2]	Sept. 24, 1913	Geo. D. Manville	West Canal extension lateral excavation.	1,552.00	[1] 1,288.17	Dec. 31, 1913
512	Aug. 30, 1913	Ellsworth-Klaner Construction Co.	East Canal excavation.	16,572.00	[1] 15,356.44	Mar. 16, 1914
526	Dec. 22, 1913	Orman Construction Co.	Lower Selig extension canal.	7,199.00	[1] 6,877.86	May 1, 1914
[2]	May 29, 1914	do	Canal excavation	847.00	[1] 864.64	July 31, 1914

IDAHO, BOISE PROJECT.

466	Dec. 10, 1912	Wheeling Mold & Foundry Co.	Gates	$26,100.00	[1] $21,414.77	Apr. 23, 1913
508	Aug. 21, 1913	Standard Underground Cable Co.	Transmission wire	6,079.05	[1] 6,074.55	Oct. 3, 1913
514	Sept. 23, 1913	Minneapolis Steel & Machinery Co.	Discharge pipes	19,420.42	[1] 19,872.87	July 15, 1914
530	Feb. 10, 1914	Inland Steel Co	Steel bars	6,370.00	[1] 6,197.76	Apr. 1, 1914
548	June 5, 1914	Joshua Hendy Iron Works.	Balanced valves	70,528.00		June 15, 1915

[1] Completed. [2] Informal.

Principal current contracts—Continued.

IDAHO, MINIDOKA PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1914.	Completion due.
	Aug. 9, 1913	Westinghouse Electric & Manufacturing Co.	Substation equipment	$4,086.00	$4,086.00	Nov. 5, 1913
505	July 23, 1913	Standard Underground Cable Co.	Copper wire	14,250.16	[1] 14,250.16	Sept. 5, 1913
507	Aug. 8, 1913	B. F. Kierulff, jr., & Co.	Transformers	5,310.00	[1] 5,310.00	Oct. 12, 1913
	Mar. 3, 1913	Bucyrus Co	Electric drag-line excavators.	22,300.00	[1] 22,275.00	Aug. 31, 1913

MONTANA, FLATHEAD PROJECT.

407	Sept. 19, 1911	Nelson Rich	Pablo dams and canals	$116,093.00	$161,308.36	Nov. 1, 1912
517	Nov. 3, 1913	Wilson Bros	Covering earthwork	33,231.00	18,070.16	Apr. 30, 1915
531	Feb. 10, 1914	Inland Steel Co	Steel reinforcement bars.	892.50	856.38	Apr. 1, 1914
539	Apr. 7, 1914	American Spiral Pipe Works.	Riveted pipe and fittings.	4,330.00	4,330.00	May 1, 1914
540	Apr. 22, 1914	Hess Flume Co	Metal flumes	11,307.50	4,758.00	[2] Aug. 1, 1914
541	Apr. 18, 1914	Nelson Rich	Earthwork and tunnel	13,950.00	8,467.50	July 8, 1914

MONTANA, HUNTLEY PROJECT.

495	June 11, 1913	E. Lindstrom	Construction of tile drains.	$38,521.50	[1] $39,146.85	Apr. 30, 1914

MONTANA, MILK RIVER PROJECT.

462	Nov. 6, 1912	Winston Bros. Co	Earthwork, schedule 4, Dodson South Canal.	$77,600.00	[1] $84,928.00	June 30, 1914
464	do	Chas. Wilhite & Co.	Earthwork, schedules 1 to 3, Dodson South Canal.	163,330.00	[1] 177,180.96	Apr. 1, 1914
476	Dec. 21, 1912	Tebbs & Taggart	Earthwork, schedule 1, Dodson North Canal.	17,650.00	[1] 17,202.91	May 31, 1914
478	do	J. E. Hilton	Earthwork, schedule 3, Dodson North Canal.	24,300.00	[1] 22,376.66	Do.
479	Jan. 10, 1913	Chas. Wilhite & Co.	Earthwork, schedule 2, Vandalia South Canal.	51,700.00	[1] 57,393.76	Do
480	Jan. 17, 1913	J. E. Hilton	Earthwork, schedules 1 and 3, Vandalia South Canal.	118,150.00	[1] 117,990.18	Do.
	May 3, 1913	Buchanan & Co	Earthwork, schedule 2, Dodson North Canal.	42,450.00	[1] 41,203.95	Do.
509	Aug. 30, 1913	Heuser & Sim	Earthwork and structures, schedules 1, 2, and 3, Dodson North Canal.	66,444.60	60,451.59	Oct. 1, 1914
515	Oct. 10, 1913	Chas. Wilhite & Co.	Earthwork, schedules 1 to 6, Dodson South Canal.	15,140.00	[1] 14,900.90	Nov. 30, 1913
524	Dec. 15, 1913	Threet Bros. & Jolley.	Earthwork and structures, schedule 4, Vandalia South Canal.	42,120.95	8,619.66	Nov. 30, 1914
525	Dec. 20, 1913	Tebbs, Taggart Jurgens & Knipe.	Earthwork, schedules 1 to 3, Vandalia South Canal.	74,093.80	33,339.93	Nov. 30, 1914

[1] Completed. [2] Estimated.

Principal current contracts—Continued.

MONTANA, MILK RIVER PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1914.	Completion due.
540	Apr. 22, 1914	Hess Flume Co.	Flumes, schedules 4, 5, and 6.	[1] 8,161.02	8,161.02	May 25, 1914
543	May 1, 1914	J. B. Kendall Co.	Reinforcement			Nov. 1, 1914
549	June 8, 1914	James O'Connor	Earthwork, Vandalia diversion	25,220.00		Dec. 15, 1914
551	June 27, 1914	Threet Bros. & Jolley.	Vandalia South Canal, second unit, schedule.	13,850.75		Nov. 30, 1914
553	June 23, 1914	W. J. Hoy Co.	Vandalia Point	42,641.10		Dec. 31, 1914

MONTANA, MILK RIVER PROJECT—ST. MARY STORAGE UNIT.

458	Aug. 7, 1912	The Wm. B. Pollock Co.	Steel pipe	$20,993.55	[2] $21,675.33	Feb. 12, 1913
504	July 12, 1913	Adelbert Cazier	Earthwork, schedule 4.	104,030.00	56,939.59	Sept. 30, 1915
510	Aug. 5, 1913	J. E. Hilton	Earthwork schedules 1 and 3.	180,080.00	67,723.05	Do.
529	Jan. 19, 1914	Illinois Steel Bridge Co.	Highway steel bridge	1,689.58	[2] 1,464.58	Mar. 2, 1914
540	Apr. 22, 1914	Hess Flume Co.	Flume	3,721.10	None.	May 25, 1914
544	May 27, 1914	Midwest Engineering Co.	Schedules 8, 9, 10, 12-19, and 22.	91,854.83	1,116.42	[3]
547	....do....	Condon & Williams.	Schedules 20 and 21	67,540.00	7,648.72	Oct. 31, 1915
558	June 27, 1914	....do....	Schedules 2a, 5, 7, and 11.	159,489.90	None.	[4]

MONTANA, SUN RIVER PROJECT.

511	Sept. 17, 1913	MacArthur Bros. Co.	Schedules 1-6, Pishkun reservoir supply and Sun River slope canals.	$858,615.00	$292,511.31	Aug. 1, 1916
532	Jan. 24, 1914	Hayden Bros. Co.	Structures, Pishkun reservoir supply and Sun River slope canals.	242,975.50 248,255.00	28,729.33	Oct. 30, 1913
	Nov. 13, 1913	R. P. & C. B. Murrill.	Freighting	10,000.00	5,846.28	Oct. 31, 1914
	Feb. 19, 1913	Great Falls Power Co.	Furnishing electrical energy.	60,000.00	3,852.88	Feb. 19, 1919
	Nov. 22, 1913	Mayer & Huffaker	Manufacturing lumber.	4,671.64	[2] 4,671.64	

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

465	Nov. 18, 1912	Henry Dore	Earthwork, schedule 2.	$10,448.00	[2] $11,429.45	July 31, 1913
469	Sept. 28, 1912	J. M. Kerr	Earthwork, schedule 1.	12,656.50	[2] 11,587.03	July 11, 1913

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

	Mar. 31, 1914	Fred Larsen	Schedules 24 and 26, Lowline Canal.	$1,087.50	$967.50	Sept. 1, 1914
	....do....	Earl Wildman	Schedule 25, Lowline Canal.	893.00	578.00	Do.
	May 25, 1914	W. C. Broadbent	Schedule 28, Lowline Canal; and schedules 1 and 2, Lowline laterals.	3,832.50	1,347.00	Do.
	Oct. 29, 1913	Cadwell & Hough	Schedules 10-13, inclusive, Lowline laterals.	3,605.50	2,195.25	[5]

[1] Includes St. Mary storage unit.
[2] Completed.
[3] Schedules 9 and 10, Sept. 15, 1914; schedules 13 and 18, Oct. 31, 1914; balance, Oct. 31, 1915.
[4] Schedules 11, June 15, 1915; balance, Oct. 31, 1915.
[5] May 10, 1914, schedules 12 and 13 extended to July 28, 1914.

Principal current contracts—Continued.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1914.	Completion due.
449	May 24, 1912	Bartlett & Kling	Dam No. 3	$348,047.00	$238,779.46	(1)
	May 16, 1914	W. C. Broadbent	Schedule 2, diversion ditch.	118.75	[2] 119.37	June 30, 1914
	May 14, 1914	J. L. Selby	Schedule 1, diversion ditch.	370.70	[2] 370.95	Do.
	do	J. W. Talmage	Schedule 3, diversion ditch.	399.60	[2] 380.52	Do.
	May 16, 1914	R. Deemer	Schedule 4, diversion ditch.	283.50	[2] 297.78	Do.
470	Dec. 23, 1912	Lacy Bros	Schedules 13 and 14, Lowline Canal.	8,716.50	[3] 8,666.11	Sept. 15, 1913
471	Dec. 24, 1912	Jas. W. Talmage	Schedule 12, Lowline Canal.	2,959.00	[3] 2,914.76	Do.
472	Dec. 27, 1912	J. F. McAlister	Schedule 8, Lowline Canal.	2,707.50	[3] 2,530.21	Do.
473	Dec. 21, 1912	W. C. Broadbent	Schedules 16 and 17, Lowline Canal.	6,393.00	[3] 7,860.10	Do.
474	Dec. 24, 1912	Peterson & Christensen.	Schedules 10 and 11, Lowline Canal.	9,929.00	[3] 9,558.50	Do.
475	Dec. 21, 1912	A. J. Parish	Schedules 6 and 7, Lowline Canal.	8,776.50	[3] 10,000.84	Do.
477	Dec. 26, 1912	W. L. Townsend	Schedules 2, 3, 4, 9, 15, Lowline Canal.	33,424.50	[3] 33,373.92	Do.
481	do	Ira M. Hewitt	Schedule 1, Lowline Canal.	6,752.00	[3] 6,063.87	Do.
482	Jan. 9, 1913	Fred Larsen	Schedule 5, Lowline Canal.	2,799.00	[3] 3,010.22	Do.
522	Dec. 17, 1913	Pittsburgh Valve, Foundry & Construction Co.	Needle-regulating valves.	4,528.00	[3] 4,028.00	May. 11, 1914
528	Jan. 24, 1914	East Jersey Pipe Co.	Outlet pipes	4,288.00	[3] 4,238.00	Feb. 9, 1914

NEVADA, TRUCKEE-CARSON PROJECT.

467	Dec. 17, 1912	Rosedale Foundry & Machine Co.	Gates and valves	$29,800.00	[3] $30,307.36	June 25, 1913

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

456	July 19, 1912	Traylor Engineering & Manufacturing Co.	Crushing and pulverizing machinery.	$13,150.00	[3] $12,340.00	June 25, 1913
457	Aug. 1, 1912	Stephens-Adamson Manufacturing Co.	Conveying machinery for cement plant.	6,176.00	[3] 7,226.63	June 23, 1913
506	Aug. 1, 1913	Hinman Hydraulic Manufacturing Co	Sluice and penstock gates	47,693.00	26,511.76	Aug 15, 1914
523	Dec 19, 1913	Coffin Valve Co	Service gates	23,248.00		July 28, 1914
527	Jan 7, 1914	Best Manufacturing Co.	Balanced valves	24,980.00		Sept. 15, 1914
533	Feb. 7, 1914	R. M. Eddy Foundry Co.	Pipes and castings	7,942.00		June 24, 1914

OREGON, UMATILLA PROJECT.

552	June 26, 1914	Morrison-Knudsen Co.	Three Mile Falls diversion works.	$31,865.00		Dec. 31, 1914

OREGON-CALIFORNIA, KLAMATH PROJECT.

460	Sept. 20, 1912	Maney Bros. & Co.	Laterals, schedules 1–7.	$67,212.50	[3] $69,864.01	Nov. 1, 1913

[1] Extended to Feb. 1, 1915. [2] Completed on June 30, 1914. [3] Completed.

Principal current contracts—Continued.

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings, June 30, 1914.	Completion due.
234	Apr. 8, 1909	National Surety Co.	Dam and canal	$693,187.34	[1] $752,211.46	July 1, 1911
493	June 5, 1913	Abram S. Perry	Earthwork	10,460.00	[1] 10,055.12	Nov. 30, 1913
494	June 3, 1913	Omer Merrill	do	11,809.00	[1] 10,820.82	Dec. 20, 1913
496	June 2, 1913	Gardner & Chambers	do	4,600.20	[1] 4,339.93	Nov. 30, 1913
542	May 5, 1914	Owen Construction Co.	do	29,718.40	7,125.11	Nov. 30, 1914

WASHINGTON, OKANOGAN PROJECT.

	May 28, 1914	Chas. C. Moore & Co.	Centrifugal pumps	$2,450.00	.....	Aug. 17, 1914
550	June 22, 1914	Pelton Water Wheel Co.	Hydraulic apparatus	6,241.00	.....	Oct. 10, 1914

WASHINGTON, YAKIMA PROJECT.

	Apr. 20, 1914	R. D. Rovig	Hauling between Naches City and Clear Creek Dam.	$8,000.00	$3,012.86	Nov. 1, 1914

CEMENT.

Contracts for cement.

[The table contains data relating to the contracts for cement in operation or completed during the fiscal year ending June 30, 1914.]

No.	Date.	Contractor.	Price per barrel, f. o. b. works.	Estimated number of barrels.	Estimated value.	Estimated earnings, June 30, 1914.	Completion due.
370	May 10, 1911	Portland Cement Co. of Utah	$1.50	12,000	$18,000	[1] $23,151.20	Mar. 31, 1912
371	Apr. 29, 1911	Three Forks Portland Cement Co.	1.18	8,000	9,440	[1] 9,313.80	Do.
393	May 20, 1911	Henry Cowell Lime & Cement Co.	1.24	43,000	53,320	[1] 58,560.30	Do.
429	Jan. 26, 1912	Iola Portland Cement Co	.60	20,000	12,000	[1] 11,577.00	May 1, 1912
431	Feb. 19, 1912	Colorado Portland Cement Co	.95	13,000	12,350	[1] 11,141.14	Mar. 31, 1913
432	do	Iola Portland Cement Co	.70	25,000	17,500	[1] 19,238.60	Do.
434	Mar. 1, 1912	Riverside Portland Cement Co	1.37½	12,000	16,500	4,181.25	May 1, 1915
435	Feb. 27, 1912	Pacific Portland Cement Co	1.32	27,000	35,640	[1] 33,843.90	Apr. 30, 1913
437	Mar. 14, 1912	Lehigh Portland Cement Co	.75	8,000	6,000	3,590.40	Mar. 31, 1913
439	Mar. 21, 1912	Ogden Portland Cement Co	1.10	42,000	46,200	55,440.00	July 1, 1914
446	do	Three Forks Portland Cement Co.	1.20	5,000	6,000	[1] 5,923.90	July 31, 1913
453	June 1, 1912	Ash Grove Lime & Portland Cement Co.	.70	10,000	7,000	[1] 9,577.10	Mar. 31, 1913
463	Nov. 8, 1912	Ogden Portland Cement Co	.99	130,000	128,700	89,913.78	Dec. 31, 1915
468	Dec. 5, 1912	Union Portland Cement Co	.98	130,000	127,400	94,842.44	Do.
487	Feb. 24, 1913	Southwestern Portland Cement Co.	1.40	50,000	70,000	[1] 84,076.30	May 1, 1914
488	Feb. 25, 1913	Colorado Portland Cement Co	.99	31,000	30,690	[1] 36,309.34	Do.
489	Feb. 28, 1913	Three Forks Portland Cement Co.	1.15	50,000	57,500	17,014.90	May 1, 1915
490	Mar. 3, 1913	Union Portland Cement Co	.99	20,000	19,800	21,016.92	May 1, 1914
491	Mar. 12, 1913	Standard Portland Cement Corporation.	1.40	30,000	42,000	8,547.40	May 1, 1915
534	Mar. 10, 1914	Lehigh Portland Cement Co	1.00	13,000	13,000	8,560.30	Do.
535	Mar. 11, 1914	United States Portland Cement Co.	.96	12,000	11,520	460.80	Do.
536	Mar. 7, 1914	Inland Portland Cement Co	.98	10,000	9,800	2,642.08	Do.
537	Mar. 14, 1914	Dewey Portland Cement Co	.82	16,000	13,120	328.00	Do.
545	May 25, 1914	Southwestern Portland Cement Co.	1.40	120,335	168,469	.....	Do.
554	June 29, 1914	Colorado Portland Cement Co	1.00	45,000	45,000	37,500.00	Do.
555	June 26, 1914	Ogden Portland Cement Co	1.33	5,500	7,315	.....	Do.

[1] Completed.

Purchases of cement during fiscal year 1914.

Contract No.:	Barrels.
434	1,750
439	16,060
463	76,541
468	90,117
487	60,054
488	35,010
489	14,770
490	21,229
491	5,415
534	8,735
535	480
536	2,696
554	37,500
Total	370,757

Tabulation of cement tests from Jan. 1, 1904, to June 30, 1914.

[Average of accepted cement.]

Brand.	Quantity (barrels).	Fineness.		Setting time.		Specific gravity.	Composition of briquets.	Tensile strength.	
								1 day.	
		Per cent passing No. 100 sieve.	Per cent passing No. 200 sieve.	Initial.	Final.			Number of briquets.	Pounds per square inch.
				H. m.	*H. m.*				
Ash Grove	30,850	95.6	82.2	3 51	7 25	3.16	Neat	30	361
							3 to 1		
Atlas (Hannibal, Mo.)	17,690	96.2	78.2	1 45	5 02	3.17	Neat	30	353
							3 to 1		
Concrete	480	96.9	80.2	4 33	7 47	3.13	Neat	20	386
							3 to 1		
Cowboy	15,645	96.1	77.1	3 11	6 15	3.16	Neat	30	294
							3 to 1		
Dewey	1,630	96.6	80.3	3 50	7 20	3.14	Neat	10	422
							3 to 1		
El Toro	107,543	93.4	77.7	2 53	5 08	3.16	Neat	310	344
							3 to 1		
Golden Gate	218,228	95.6	77.7	3 21	5 49	3.12	Neat	95	308
							3 to 1		
Ideal	206,691	96.2	79.8	3 46	7 15	3.13	Neat	110	392
							3 to 1		
Inland	2,696	95.3	79.9	3 36	5 35	3.12	Neat	15	375
							3 to 1		
Iola	163,317	94.0	78.3	3 54	8 02	3.16	Neat	115	364
							3 to 1		
Lehigh (Mason City, Iowa)	13,785	95.8	79.1	3 35	5 58	3.17	Neat	20	381
							3 to 1		
Marquette	32,155	94.7	77.3	3 18	7 05	3.15	Neat	35	384
							3 to 1		
Mount Diablo	43,740	95.0	78.8	3 40	6 22	3.13	Neat	30	386
							3 to 1		
Ogden	141,456	96.8	78.9	4 30	7 54	3.16	Neat	45	326
							3 to 1		
Red Devil (Devils Slide, Utah)	150,094	96.3	79.0	3 32	6 36	3.14	Neat	60	382
							3 to 1		
Red Devil (Trident, Mont.)	26,411	98.3	84.1	3 55	6 41	3.17	Neat	45	340
							3 to 1		
Red Diamond [1]	19,711	96.1	74.8	3 57	8 22	3.15	Neat	35	329
							3 to 1		
Riverside	20,550	96.2	80.9	5 08	8 27	3.14	Neat	15	369
							3 to 1		
Spokane	1,500	96.9	83.6	4 00	6 30	3.14	Neat	5	369
							3 to 1		
Standard (Napa Junction, Cal.)	18,421	97.5	83.8	4 10	6 26	3.05	Neat	25	245
							3 to 1		
Sunflower	95,030	94.3	78.1	3 39	7 23	3.15	Neat	70	363
							3 to 1		
Universal (South Chicago, Ill.)	184,100	96.9	81.0	3 24	7 26	3.14	Neat	70	343
							3 to 1		
Utah [1]	26,498	97.0	81.6	4 34	7 36	3.15	Neat	35	369
							3 to 1		
Yankton	28,484	96.3	80.4	3 53	8 28	3.21	Neat	85	261
							3 to 1		
Total	1,566,705	95.7	79.1	3 41	6 59	3.14	Neat	1,340	346
							3 to 1		

[1] Made by same company. Brand name changed from Red Diamond to Utah, June, 1910.

NOTE.—In considering the results of long-time tests, as shown above, it should be borne in mind that while the results for the different periods are approximately comparable they are not directly comparable, as in most cases there is a difference in the number of briquets represented by the results for various periods on the different brands, owing to the fact that new sets are being started from time to time, the results of which become available at different periods.

Tabulation of cement tests from Jan. 1, 1904, to June 30, 1914.

[Average of accepted cement.]

Tensile strength.																	
7 days.		28 days.		3 months.		6 months.		1 year.		2 years.		3 years.		5 years.		7½ years.	
Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.
655	766	655	797	40	770	40	757	40	732	30	769	30	754	5	710		
655	348	655	452	40	470	40	459	40	439	30	444	30	432	5	426		
385	603	385	667	30	705	30	670	30	689	30	739	30	692	5	698		
385	235	385	358	30	467	30	437	30	439	30	413	30	405	5	438		
89	735	84	728	15	847	15	742	15	734	15	666	15	652	5	710		
89	337	84	428	15	436	15	433	15	422	15	400	15	406	5	420		
575	756	575	876	30	845	30	840	30	810	30	775	30	735	25	719	15	733
575	279	575	393	30	445	30	461	30	448	30	438	30	419	25	423	15	434
60	707	60	761	5	741	5	767	5	739	5	692	5	740	5	754		
60	326	60	410	5	450	5	482	5	459	5	420	5	423	5	427		
1,648	681	1,646	791	380	757	245	813	125	815	45	799	40	800				
1,648	270	1,646	344	380	364	245	418	125	418	45	439	40	449				
7,240	649	5,874	787	235	763	90	706	80	685	60	687	35	691	10	732		
7,240	214	5,874	341	235	438	90	429	80	405	60	407	35	398	10	412		
3,849	685	3,849	733	110	725	110	741	105	698	95	715	90	697	65	675	40	682
3,849	298	3,849	398	110	450	110	452	105	463	95	449	90	426	65	420	40	403
225	738	225	792	5	749	5	665										
225	324	225	432	5	420	5	427										
3,082	771	3,082	811	130	812	125	796	125	791	120	777	110	752	70	722	35	753
3,082	315	3,082	432	130	451	125	447	125	420	120	412	110	387	70	394	35	380
334	688	329	750	15	739	15	700	10	721	5	807						
334	293	329	431	15	470	15	462	10	435	5	453						
635	724	635	822	35	755	35	737	35	724	35	749	35	704	25	705		
635	296	635	402	35	441	35	447	35	446	35	459	35	437	25	433		
433	668	433	738	35	759	30	721	30	707	25	703	5	753	5	655		
433	240	433	341	35	414	30	431	30	414	25	396	5	353	5	350		
2,630	663	2,630	734	45	759	30	699	25	687	10	688	5	641				
2,630	292	2,630	411	45	447	30	450	25	438	10	441	5	405				
2,656	721	2,656	773	70	780	60	771	50	755	40	770	40	766	10	804		
2,656	334	2,656	435	70	457	60	464	50	426	40	398	40	413	10	388		
810	688	810	724	40	728	35	686	30	675	20	708	10	650				
810	340	810	443	40	488	35	463	30	450	20	456	10	393				
1,195	649	1,195	717	45	738	45	761	40	790	40	793	40	724	40	701	40	695
1,195	302	1,195	406	45	477	45	498	40	509	40	472	40	421	40	404	40	412
423	679	423	726	15	728	15	743	10	716	5	751						
423	305	423	400	15	452	15	452	10	443	5	401						
55	681	55	722	5	721	5	691										
55	320	55	422	5	443	5	457										
467	624	488	729	30	709	15	651	10	630	10	577	10	654				
467	255	488	367	30	459	15	504	10	509	10	514	10	506				
1,375	793	1,375	879	70	843	70	823	70	777	70	766	65	741	60	728	15	759
1,375	288	1,375	432	70	447	70	441	70	405	70	388	65	383	60	381	15	349
3,635	659	3,635	803	70	860	70	817	70	799	70	781	70	751	65	753	35	731
3,635	263	3,635	375	70	420	70	407	70	402	70	372	70	346	65	350	35	347
1,002	616	1,007	696	40	701	40	736	40	735	30	752	5	762				
1,002	330	1,007	429	40	468	40	468	40	453	30	414	5	427				
945	644	945	775	60	791	60	785	60	773	60	748	60	768	45	706	15	721
945	252	945	357	60	433	60	440	60	430	60	414	60	420	45	408	15	406
34,403	685	33,051	774	1,555	754	1,220	766	1,035	752	850	749	730	733	440	717	195	719
34,403	279	33,051	392	1,555	419	1,220	442	1,035	432	850	420	730	406	440	397	195	389

ELECTRICAL AND MECHANICAL ENGINEERING.

The following is a general report of the progress of the work under the direction of this office during the year ending June 30, 1914:

Arizona, Salt River project.—Drawings of all details of the Crosscut power plant were completed and all necessary specifications prepared for the purchase of material and for the construction of this plant. The construction work was inspected and supervised, and at the end of the fiscal year practically all of the concrete had been placed and the erection of machinery begun.

The construction of the Roosevelt-Miami transmission line was completed and the delivery of power to the Inspiration Co. begun in March, 1914. The reconstruction of the Roosevelt-Mesa transmission line was completed during the year.

Plans and specifications for the installation of the sixth unit at the Roosevelt power house were completed and specifications for the machinery issued.

Plans were made for the reequipment of the McQueen wells and the wells tested to determine the size of pump to be installed.

A surge tank for the Highline pumping plant was designed and installed.

Repair parts for the balanced valves at the Roosevelt Dam were purchased and supervision given to the repair work on these valves.

Miscellaneous purchases of equipment and repair parts for various features of the project were made.

A study was made of the power situation on this project and report prepared on the history and the future prospects of the power system.

Arizona-California, Yuma project.—A drainage pumping plant consisting of two 25-second-feet centrifugal pumps, gear driven by automobile-type gasoline engines, was designed and machinery purchased.

Idaho, Boise project.—A thorough study was made of the installation of twenty 58-inch balanced valves to control the discharge of the Arrowrock Dam. Tests were made of a control device for these valves, final designs and specifications were prepared, and the valves purchased. Semisteel discharge pipes for the balanced valves were also designed and purchased.

Preliminary studies and estimates were made of a hydroelectric power plant for the Arrowrock Dam and transmission line for supplying power to the Gem irrigation district.

Assistance was given in the purchase and installation of substations, transmission line, and electrically driven excavating machinery for the Pioneer irrigation district.

Assistance was given in the matter of the sale of surplus power from the Boise power plant.

Idaho, Minidoka project.—The purchase, installation, and test of five increased capacity impellers for the South Side pumps were completed with very satisfactory results, the new impellers increasing the capacity of the pumps from 125 to 165 second-feet, with greatly improved efficiency.

A scoop wheel was designed, purchased, and installed for the A–4 raise on the north side of the river.

Apparatus was purchased for the Burley substation and this substation constructed and placed in operation during the year. A transmission line was built from the second lift to Burley and the capacity of the Rupert substation considerably increased.

Radial gate-operating mechanisms for the new sluice gates at the Minidoka Dam were designed and purchased.

Assistance was given in the purchase of transmission-line equipment and electrical excavating machinery for use in connection with the drainage work on the project.

Kansas, Garden City project.—Assistance was given in estimating the damage to motors resulting from burning of storehouse in which the apparatus was stored.

Montana, Huntley project.—Assistance was given in the purchase of material for repair of the direct pumping units.

Montana, Milk River project.—Specifications were prepared for the purchase of riveted steel pressure pipes for the Hall coulee and St. Mary crossing.

Studies were in progress during May and June, 1914, of a 14-foot cylinder gate to control the discharge from the Sherburne Lake Reservior.

Montana, Sun River project.—Miscellaneous small purchases were made of electrical construction equipment for canal and dam construction in progress.

Nebraska-Wyoming, North Platte project.—Outlet pipes and needle discharge valves were designed and purchased for the controlling works of the Minatare Reservoir. A small turbine-driven pump was purchased for use in connection with the operation of the balanced valves at the Pathfinder Dam.

Nevada, Truckee-Carson project.—Specifications for the lease of the Lahontan power plant, transmission line, and substation were prepared and studies made for the possible installation of a third unit to be installed in connection with this lease.

The proposition of connecting the present penstock directly with the reservoir was given consideration.

A small drainage pumping unit was purchased and a distributing circuit added to the Fallon substation to serve this pump and near-by customers.

New Mexico-Texas, Rio Grande project, Elephant Butte storage.—Correspondence was carried on with the manufacturers regarding repairs to the Elephant Butte steam plant, and several small purchases were made and arrangements completed with the American Pump Co. for rebuilding certain pumps furnished for this work.

North Dakota, North Dakota pumping project.—The rearrangement of the transmission-line circuits from the Williston power plant was considered in connection with the operation of the Buford pumping station and the proposed contract for the sale of power to the town of Mondak, Mont.

Oregon, Columbia River power project.—The chief electrical engineer served as a member of the consulting board representing the Reclamation Service on the investigation of the proposed power development.

Utah, Strawberry Valley project.—Assistance was given in preparing specifications for the sale of power to the town of Springville.

and a historical report of the power plant was prepared, and a study made of the proper rate of depreciation for the power system. Repair parts for the hydraulic turbines at the power plant were purchased and installed, the machines being thoroughly overhauled.

Washington, Okanogan project.—Preliminary plans and specifications for two power plants and a pumping plant for irrigating 1,160 acres of land on Robinson Flat were prepared, and machinery was purchased and the preparation of working drawings begun.

Washington, Yakima project, Sunnyside unit.—Preliminary plans and specifications were prepared for a direct pumping plant for the Snipes Mountain irrigation district, and estimates of the cost of various other small pumping plants for this project were worked out.

Wyoming, Shoshone project.—At the end of the fiscal year studies are in progress of the proposed installation of two 58-inch balanced valves for controlling the outlet of the Shoshone Reservoir, and a turbine-driven lighting unit was purchased for this work.

General.—Supervision was given to the operation of the various power plants of the service, and in this connection a uniform classification of operation accounts and uniform report forms for power-plant operation were worked out. All plants were placed on a uniform basis of depreciation charges.

A considerable amount of work was done toward compiling a descriptive and historical report covering all of the power plants which have been constructed.

A representative of this office spent several months visiting the various factories in the East in connection with inspection of materials and apparatus, and as a result of this work the inspection of materials for the entire service was placed under the general direction of an engineer located at Chicago, who acts under the supervision of the Los Angeles office.

UNIT BIDS AND CONTRACT PRICES.

Unit bids and contract prices on formal specifications.

BACKFILLING.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Oregon, Umatilla	May 28, 1914	268	Three Mile Falls Dam	Cubic yards	200	$0.25	$0.40	$0.50

BRIDGE, STEEL.

Montana, Milk River	Dec. 22, 1913	251	St. Mary headworks, 2 spans, 97 feet 6 inches each	Lump sum	2 spans.	$1,689.58	$1,833.00	$1,689.58

CLEARING AND GRUBBING.

Colorado, Grand Valley	June 16, 1914	269	Main Canal, schedule 1, stations 365–420	Acre	16.05	$20.00	$25.00	$40.00
Do	do	269	Main Canal, schedule 2, stations 420–470	do	15.3	20.00	25.00	40.00
Do	do	269	Main Canal, schedule 3, stations 470–530	do	18.0	20.00	25.00	40.00
Do	do	269	Main Canal, schedule 4, stations 530–580	do	16.5	20.00	25.00	40.00
Do	do	269	Malu Canal, schedule 5, stations 580–620	do	11.0	20.00	25.00	40.00
Do	do	269	Main Canal, schedule 6, stations 620–660	do	6.9	20.00	25.00	40.00
Do	do	269	Main Canal, schedule 7, stations 660–730	do	12.7	20.00	25.00	40.00
Do	do	269	Main Canal, schedule 8, stations 730–770	do	12.4	20.00	25.00	40.00
Do	do	269	Main Canal, schedule 9, stations 770–820	do	15.8	20.00	25.00	40.00

CONCRETE.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3	Cubic yards	1,160	$8.00	$9.50	$8.00
Do	Nov. 12, 1913	246	Vandalia South Canal	do	2,600	10.00	16.00	10.00
Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir supply canal, schedule 1, structures, stations 246+90.	do	675	12.50	13.00	12.50
Do	do	249	Pishkun Reservoir supply canal, schedule 1, Arnold Coulee drop.	do	425	14.00	19.00	14.00
Do	do	249	Pishkun Reservoir supply canal, schedule 1, Arnold Coulee stilling basin.	do	600	9.00	10.00	9.00

Unit bids and contract prices on formal specifications—Continued.

CONCRETE—Continued.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Sun River	Dec. 18, 1813	249	Pishkun Reservoir supply canal, schedule 1, reservoir intake.	Cubic yards	575	$9.00	$16.80	$9.00
Do	do	249	Pishkun Reservoir supply canal, schedule 1, reservoir drop, stilling basin.	do	300	8.00	8.00	8.00
Do	do	249	Pishkun Reservoir supply canal, schedule 1, spillway stations 586+25.	do	250	12.00	17.00	12.00
Do	do	249	Pishkun Reservoir supply canal, schedule 1, canal lining.	do	500	8.00	11.50	8.00
Do	do	249	Pishkun Reservoir supply canal, schedule 1, miscellaneous structures.	do	775	14.00	15.00	14.00
Do	do	249	Sun River Slope canal, schedule 2, headworks	do	730	11.00	12.75	11.00
Do	do	249	Sun River Slope canal, schedule 2, siphon spillways.	do	125	13.00	13.75	13.00
Do	do	249	Sun River Slope canal, schedule 2, canal lining	do	5,700	6.00	9.00	6.00
Do	do	249	Sun River Slope canal, schedule 2, miscellaneous structures.	do	1,100	13.75	14.50	14.50
Do	do	249	Sun River Slope canal, schedule 3, Big Coulee drop No. 1, intake.	do	725	14.50	15.75	14.50
Do	do	249	Sun River Slope canal, schedule 3, Big Coulee drop No. 1, basin.	do	475	9.00	10.00	9.00
Do	do	249	Sun River Slope canal, schedule 3, Big Coulee drop No. 2, intake.	do	600	11.00	14.00	11.00
Do	do	249	Sun River Slope canal, schedule 3, Big Coulee drop No. 2, basin.	do	450	9.00	10.00	9.00
Do	do	249	Sun River Slope canal, schedule 3, miscellaneous structures.	do	250	13.00	15.00	13.00
Montana, Milk River	{Apr. 15, 1914 / May 18, 1914}	255	St. Mary Canal, headworks, schedule 5	do	1,050	10.00	14.75	10.00
Do	{Apr. 15, 1914 / May 18, 1914}	255	St. Mary Canal, bridges, schedule 6	do	35	18.00	18.00	(1)
Do	Apr. 15, 1914	255	St. Mary Canal, check gates, schedule 8	do	115	14.00	14.50	14.00
Do	do	255	St. Mary Canal, Kennedy Creek crossing, schedule 9.	do	890	7.25	15.00	7.25
Do	do	255	St. Mary Canal, sluice gates, schedule 10	do	155	7.25	12.50	7.25
Do	do	255	St. Mary Canal, Powell Creek crossing, schedule 12	do	190	8.00	12.00	8.00
Do	do	255	St. Mary Canal, crossing structures, schedule 13	do	2,100	9.00	14.00	9.00
Do	do	255	St. Mary Canal, Spider Coulee flume, schedule 14	do	245	13.50	15.50	13.50
Do	do	255	do	do	160	11.65	12.75	11.65
Do	do	255	St. Mary Canal, control gate, schedule 15	do	120	14.50	15.00	14.50
Do	do	255	St. Mary Canal, Cow Creek crossing, schedule 16	do	150	15.50	16.00	15.50
Do	do	255	St. Mary Canal, sluice gate, schedule 17	do	240	14.00	14.50	14.00

Do	do	255	St. Mary Canal, Halls Coulee crossing, schedule 18	do	340	14.50	15.50	14.50
Do	do	255	St. Mary Canal, pipe culverts, schedule 19	do	30	15.50	18.00	15.50
Do	do	255	St. Mary Canal, drops, schedule 20	do	1,870	11.50	12.65	11.50
Do	do	255	St. Mary Canal, near North Fork Milk River, schedule 21.	do	45	11.50	15.00	11.50
Do	do	255	St. Mary Canal, culverts, schedule 22	do	10	8.00	12.00	8.00
Montana, Flathead	Mar. 20, 1914	256	Pablo lateral 31A, addition tunnel lining	do	25	10.00	16.00	16.00
California, Orland	Apr. 21, 1914	259	East Park diversion dam	do	1,100	7.00	9.30	9.54
Do	do	259	East Park diversion dam and structures	do	2,840	8.68	9.30	8.68
Montana, Milk River	May 20, 1914	263	Vandalia South Canal, second unit, structures	do	300	12.00	12.50	12.50
Do	May 27, 1914	264	Vandalia Point, structures	do	1,900	7.00	9.95	7.00
Do	June 10, 1914	265	Dodson South Canal, railroad bridge	do	150	10.00	10.30	10.30
Do	do	265	Dodson South Canal, structures	do	2,500	9.50	9.80	9.80
Oregon, Umatilla	May 28, 1914	268	Three-mile Falls Dam	do	2,600	8.00	9.75	9.75

CRIBWORK, TIMBER PLACING.

Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir Supply Canal, placing logs	Linear feet	1,000	$0.10	$0.20	$0.10
Do	do	249	Pishkun Reservoir Supply Canal, placing rock	Cubic yards	200	1.25	2.50	1.25
Montana, Milk River	Apr. 15, 1914	255	St. Mary Canal, Swift Current Division, schedule 7, placing logs.	Linear feet	88,300	.11	.30	.11
Do	do	255	St. Mary Canal, Swift Current Division, schedule 7, placing filling.	Cubic yards	8,500	.60	.75	.75
Do	do	255	St. Mary Canal, Swift Current Division, schedule 7, furnish and place drift bolts.	Pounds	36,500	.05	.07	.05

EMBANKMENT, ROLLED.

Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir, supply canal, schedule 1	Cubic yards	40,000	$0.10	$0.18	$0.10
Do	do	249	Sun River Slope canal, schedule 2	do	15,000	.10	.18	.10
Do	do	249	Sun River Slope canal, schedule 3	do	20,000	.05	.10	.10
Montana, Milk River	Apr. 15, 1914	255	St. Mary Canal, earth dams, schedule 21	do	31,800	.10	.18	.10

EXCAVATION, CLASS 1, EARTH.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 1, canal	Cubic yards	139,000	$0.145	$0.155	$0.145
Do	do	241	Dodson North Canal, second unit, schedule 2, canal	do	156,000	.145	.15	.145
Do	do	241	Dodson North Canal, second unit, schedule 3, structure.	do	9,000	.45	.46	.45
Montana, Flathead	Sept. 30, 1914	245	Pablo Canals, schedule 1	do	100,000	.159	.16	.16
Do	do	245	Pablo Canals, schedule 2	do	96,000	.159	.16	.16
Montana, Milk River	Nov. 12, 1913	246	Vandalia South Canal, schedule 1	do	195,000	.147	.175	.147
Do	do	246	Vandalia South Canal, schedule 2	do	185,000	.16	.175	.16
Do	do	246	Vandalia South Canal, schedule 3	do	90,000	.16	.175	.16
Do	do	246	Vandalia South Canal, schedule 4	do	17,000	.50	.75	.50

[1] All bids rejected.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 1, EARTH—Continued.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
California, Orland	Oct. 15, 1913	247	East Park, feed canal, schedule 1	Cubic yards	30,000	$0.20	$0.233	$0.20
Do	do	247	East Park feed canal, schedule 2	do	50,000	.20	.244	.20
Do	do	247	East Park feed canal, schedule 3	do	40,000	.20	.30	.20
Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir, supply canal, structures, schedule 1.	do	13,000	.32	.55	.55
Do	do	249	do	do	15,000	.40	.65	.65
Do	do	249	Sun River Slope canal, schedule 2	do	11,000	.32	.55	.55
Do	do	249	Sun River Slope canal, schedule 3	do	20,000	.32	.55	.55
Montana, Milk River	Apr. 15 and May 18, 1914	255	St. Mary Canal, schedule 2A	do	124,000	.235	.32	.235
Do	do	255	St. Mary Canal, headworks, schedule 5	do	11,000	.30	.40	.30
Do	do	255	St. Mary Canal, bridges, schedule 6	do	10,700	.40	.50	[1]
Do	do	255	St. Mary Canal, Swift Current diversion, schedule 7	do	76,000	.36	.60	.36
Do	Apr. 15, 1914	255	St. Mary Canal, check gates, schedule 8	do	650	.40	.45	.45
Do	do	255	St. Mary Canal, Kennedy Creek crossing, schedule 9.	do	12,000	.40	.60	.90
Do	do	255	St. Mary Canal, sluice gates, schedule 10	do	700	.40	.50	.50
Do	Apr. 15 and May 18, 1914	255	St. Mary Canal, Kennedy Creek dikes, schedule 11	do	37,000	.42	.42	.42
Do	Apr. 15, 1914	255	St. Mary Canal, Powell Creek crossing, schedule 12	do	9,200	.40	.45	.45
Do	do	255	St. Mary Canal, crossing structures, etc., schedule 13.	do	10,250	.40	.45	.45
Do	do	255	St. Mary Canal, Spider Coulee flume, schedule 14	do	2,000	.40	.45	.45
Do	do	255	St. Mary Canal, control gate, schedule 15	do	190	.50	.60	1.25
Do	do	255	St. Mary Canal, Cow Creek crossing, schedule 16	do	1,200	.40	.50	.40
Do	do	255	St. Mary Canal, sluice gate, schedule 17	do	1,250	.40	.50	.40
Do	do	255	St. Mary Canal, Halls Coulee crossing, schedule 18	do	1,300	.40	.50	.50
Do	do	255	St. Mary Canal, pipe culverts, schedule 19	do	450		.50	.50
Do	do	255	St. Mary Canal, drops, schedule 20	do	19,000	.40	.35	.25
Do	do	255	St. Mary Canal, North Fork Milk River, schedule 21	do	109,000	.25	.20	.20
Do	do	255	St. Mary Canal Culvert, schedule 22	do	150	.1975	.50	.50
Montana, Flathead	Mar. 20, 1914	256	Pablo lateral 31A	do	3,000	.40	.45	.40
California, Orland	Apr. 21, 1914	259	East Park diversion dam, etc	do	1,760	.40	.50	.40
South Dakota, Bellefourche	Apr. 15, 1914	260	North Canal extension, schedule 1	do	55,800	.40	.147	.14
Do	do	260	North Canal extension, schedule 2	do	55,600	.135	.147	.147
Do	do	260	North Canal extension laterals, schedule 3	do	50,450	.135	.147	.147
Do	do	260	North Canal, Deer Creek lateral, schedule 4	do	31,500	.135	.140	.147
Montana, Milk River	May 12, 1914	262	Vandalia spillway channel and dike [2]	do	160,000	.135	.165	.157
Do	May 20, 1914	263	Vandalia South Canal, second unit	do	135,000	.157	.143	.14
Do	do	263	Vandalia South Canal, second unit, structures	do	10,000	.14	.50	.50
Do	May 27, 1914	264	Vandalia Point, structures	do	65,000	.50	.30	.25

Do	June 10, 1914	265	Dodson South Canal, first and second units, laterals, schedule 1.	do	36,000	.25 .123	.125	.123
Do	do	265	Dodson South Canal, first and second units, laterals, schedule 2.	do	91,000	.119	.125	.119
Do	do	265	Dodson South Canal, first and second units, structures, schedule 3.	do	17,500	.45	.50	.45
Oregon, Umatilla	May 28, 1914	268	Three Mile Falls Dam [3]	do	1,100	.45	.50	.65
Colorado, Grand Valley	June 16, 1914	269	Main Canal, schedule 1, stations 365–420	do	74,500	.135	.14	.1975
Do	do	269	Main Canal, schedule 2, stations 420–470	do	61,000	.135	.14	.1975
Do	do	269	Main Canal, schedule 3, stations 470–530	do	77,800	.135	.14	.1975
Do	do	269	Main Canal, schedule 4, stations 530–580	do	58,400	.135	.14	.1975
Do	do	269	Main Canal, schedule 5, stations 580–620	do	44,000	.135	.14	.1975
Do	do	269	Main Canal, schedule 6, stations 620–660	do	43,300	.135	.15	.1975
Do	do	269	Main Canal, schedule 7, stations 660–730	do	57,600	.135	.155	.1975
Do	do	269	Main Canal, schedule 8, stations 730–770	do	46,300	.135	.15	.1975
Do	do	269	Main Canal, schedule 9, stations 770–820	do	64,700	.135	.14	.1975
Do	do	269	Main Canal, schedule 10, stations 820–870	do	57,500	.135	.14	.1975
Do	do	269	Main Canal, schedule 11, stations 870–911+50	do	25,800	.14	.15	.1975
Do	do	269	Main Canal, schedule 12, stations 911+50–970	do	65,000	.14	.15	.1975
Do	do	269	Main Canal, schedule 13, stations 970–1026	do	58,700	.14	.15	.1975
Do	do	269	Main Canal, schedule 14, stations 1026–1110	do	76,100	.15	.155	.1975
Do	do	269	Main Canal, schedule 15, stations 1110–1165	do	38,600	.15	.155	.1975
Do	do	269	Main Canal, schedule 16, stations 1165–1220	do	25,600	.15	.155	.1975
Do	do	269	Main Canal, schedule 17, stations 1220–1275	do	51,200	.15	.155	.1975
Do	do	269	Main Canal, schedule 18, stations 1275–1335	do	27,800	.15	.155	.1975
Do	do	269	Main Canal, schedule 19, stations 1335–1400	do	43,500	.15	.155	.1975
Do	do	269	Main Canal, schedule 20, stations 1400–1454	do	27,900	.15	.155	.1975
Do	do	269	Main Canal, schedule 21, stations 1454–1500	do	31,000	.15	.155	.1975
Do	do	269	Main Canal, schedule 22, stations 1500–1553	do	38,000	.15	.155	.1975
Do	do	269	Main Canal, schedule 23, stations 1553–1600	do	31,000	.15	.155	.1975
Do	do	269	Main Canal, schedule 24, stations 1600–1660	do	28,000	.15	.155	.1975
Do	do	269	Main Canal, schedule 25, stations 1660–1720	do	46,750	.15	.155	.1975
Do	do	269	Main Canal, schedule 26, stations 1720–1775	do	31,000	.15	.155	.1975
Do	do	269	Main Canal, schedule 27, stations 1775–1825	do	37,700	.15	.155	.1975
Do	do	269	Main Canal, schedule 28, stations 1825–1875	do	34,250	.15	.155	.1975
Do	do	269	Main Canal, schedule 29, stations 1875–1933	do	33,200	.15	.155	.1975

EXCAVATION, CLASS 2, INDURATED MATERIAL.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 1, canal.	Cubic yards	100	$0.35	$0.40	$0.50
Do	do	241	Dodson North Canal, second unit, schedule 2, canal	do	100	.40	.45	.50
Do	do	241	Ddoson North Canal, second unit, schedule 3, structures.	do	50	.70	.90	1.00
Montana, Flathead	Sept. 30, 1913	245	Pablo Canals, schedule 1	do	500	.29	.40	.29
Do	do	245	Pablo Canals, schedule 2	do	1,000	.29	.40	.29
Montana, Milk River	Nov. 12, 1913	246	Vandalia South Canal, schedule 1	do	50	.16	.30	.16
Do	do	246	Vandalia South Canal, schedule 2	do	50	.16	.45	.16
Do	do	246	Vandalia South Canal, schedule 3	do	50	.16	.45	.16
Do	do	246	Vandalia South Canal, schedule 4	do	50	.75	1.75	.75

[1] All bids rejected.

[2] No classification.

[3] Separate item for handling water.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 2, INDURATED MATERIAL—Continued.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
California, Orland	Oct. 15, 1913	247	East Park feed canal, schedule 1	Cubic yards	43,000	$0.30	$0.31	$0.30
Do	do	247	East Park feed canal, schedule 2	do	30,000	.30	.31	.30
Do	do	247	East Park feed canal, schedule 3	do	100	.30	.31	.30
Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir, supply canal, structures, schedule 1.	do	2,100	.60	.70	.70
Do	do	249	do	do	9,000	.75	.80	.80
Do	do	249	Sun River Slope canal, structures, schedule 2	do	1,000	.60	.70	.70
Do	do	249	Sun River Slope canal, structures, schedule 3	do	800	.60	.70	.70
Montana, Milk River	{Apr. 15, 1914 and May 18.	255	St. Mary Canal, schedule 2a	do	10,000	.33	.45	.45
Do	do	255	St. Mary Canal, head works, schedule 5	do	200	.50	.50	.50
Do	do	255	St. Mary Canal, bridges, schedule 6	do	75	.60	.75	(1)
Do	do	255	St. Mary Canal, swift-current diversion, schedule 7	do	2,000	.70	.80	.70
Do	Apr. 15, 1914	255	St. Mary Canal, check gates, schedule 8	do	35	.65	.80	.80
Do	do	255	St. Mary Canal, Kennedy Creek crossing, schedule 9.	do	500	.60	.80	.80
Do	do	255	St. Mary Canal, sluice crates, schedule 10	do	25	.60	.75	.80
Do	do	255	St. Mary Canal, Powell Creek crossing, schedule 12	do	50	.60	.70	.80
Do	do	255	St. Mary Canal, crossing, structures, etc., schedule 13.	do	200	.60	.70	1.00
Do	do	255	St. Mary Canal, Spider Coulee flume, schedule 14	do	200	.60	.80	.80
Do	do	255	St. Mary Canal, control gate, schedule 15	do	40	.60	.75	1.50
Do	do	255	St. Mary Canal, Cow Creek crossing, schedule 16	do	25	.60	.70	.80
Do	do	255	St. Mary Canal, sluice gate, schedule 17	do	25	.60	.70	.80
Do	do	255	St. Mary Canal, Halls Coulee crossing, schedule 18	do	60	.60	.75	1.00
Do	do	255	St. Mary Canal, pipe culverts, schedule 19	do	10	.60	.75	1.00
Do	do	255	St. Mary Canal, props, schedule 20	do	200	.60	.70	.60
Do	do	255	St. Mary Canal, North Fork, Milk, schedule 21	do	100	.45	.50	.60
Do	do	255	St. Mary Canal, culverts, schedule 22	do	5	.60	.75	1.00
Montana, Flathead	Mar. 20, 1914	256	Pablo lateral, 31A	do	300	.75	.90	1.00
California, Orland	Apr. 21, 1914	259	East Park diversion dam, etc	do	1,705	.60	.80	1.44
South Dakota, Bellefourche	Apr. 15, 1914	260	North Canal extension, schedule 1	do	2,000	.147	.194	.147
Do	do	260	North Canal extension, schedule 2	do	2,000	.147	.210	.147
Do	do	260	North Canal extension, laterals, schedule 3	do	500	.147	.160	.147
Do	do	260	North Canal extension, Deer Creek, laterals, schedule 4.	do	1,000	.140	.145	.147

Montana, Milk River	May 20, 1914	263	Vandalia South Canal, second unit, laterals	do	50	.14	.30	.14
Do	do	263	Vandalia South Canal, second unit, structures	do	200	.50	.70	.50
Do	May 27, 1914	264	Vandalia Point, structures	do	1,500	.50	.65	.65
Do	June 10, 1914	265	Dodson South Canal, first and second units, laterals, schedule 1.	do	100	.125	.35	.35
Do	do	265	Dodson South Canal, first and second units, laterals, schedule 2.	do	100	.125	.35	.35
Do	do	265	Dodson South Canal, first and second units, structures, schedule 3.	do	500	.60	1.00	.60
Oregon, Umatilla	May 28, 1914	268	Three Miles Fall Dam [2]	do	1,700	1.75	2.00	2.00
Colorado, Grand Valley	June 16, 1914	269	Main Canal, schedule 1, stations 365–420	do	100	.33	.35	.1975
Do	do	269	Main Canal, schedule 2, stations 420–470	do	100	.33	.35	.1975
Do	do	269	Main Canal, schedule 3, stations 470–530	do	100	.33	.35	.1975
Do	do	269	Main Canal, schedule 4, stations 530–580	do	100	.33	.35	.1975
Do	do	269	Main Canal, schedule 5, stations 580–620	do	100	.33	.35	.1975
Do	do	269	Main Canal, schedule 6, stations 620–660	do	22,600	.24	.33	.1975
Do	do	269	Main Canal, schedule 7, stations 660–730	do	59,200	.275	.33	.1975
Do	do	269	Main Canal, schedule 8, stations 730–770	do	100	.33	.35	.1975
Do	do	269	Main Canal, schedule 9, stations 770–820	do	100	.33	.35	.1975
Do	do	269	Main Canal, schedule 10, stations 820–870	do	100	.33	.35	.1975
Do	do	269	Main Canal, schedule 11, stations 870–911+50	do	38,400	.29	.35	.1975
Do	do	269	Main Canal, schedule 12, stations 911+50–970	do	7,800	.23	.35	.1975
Do	do	269	Main Canal, schedule 13, stations 970–1026	do	11,400	.25	.35	.1975
Do	do	269	Main Canal, schedule 14, stations 1026–1110	do	55,000	.25	.35	.1975
Do	do	269	Main Canal, schedule 15, stations 1110–1165	do	23,100	.24	.35	.1975
Do	do	269	Main Canal, schedule 16, stations 1165–1220	do	31,600	.28	.35	.1975
Do	do	269	Main Canal, schedule 17, stations 1220–1275	do	11,400	.35	.40	.1975
Do	do	269	Main Canal, schedule 18, stations 1275–1335	do	35,000	.275	.35	.1975
Do	do	269	Main Canal, schedule 19, stations 1335–1400	do	21,900	.23	.34	.1975
Do	do	269	Main Canal, schedule 20, stations 1400–1454	do	26,500	.265	.34	.1975
Do	do	269	Main Canal, schedule 21, stations 1454–1500	do	19,600	.24	.34	.1975
Do	do	269	Main Canal, schedule 22, stations 1500–1553	do	34,000	.26	.34	.1975
Do	do	269	Main Canal, schedule 23, stations 1553–1600	do	22,700	.25	.34	.1975
Do	do	269	Main Canal, schedule 24, stations 1600–1660	do	20,200	.25	.33	.1975
Do	do	269	Main Canal, schedule 25, stations 1660–1720	do	5,000	.22	.34	.1975
Do	do	269	Main Canal, schedule 26, stations 1720–1775	do	17,000	.23	.33	.1975
Do	do	269	Main Canal, schedule 27, stations 1775–1825	do	15,500	.22	.34	.1975
Do	do	269	Main Canal, schedule 28, stations 1825–1875	do	15,000	.22	.34	.1975
Do	do	269	Main Canal, schedule 29, stations 1875–1933	do	17,000	.22	.30	.1975

[1] All bids rejected.

[2] Separate item for handling water.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 3, ROCK.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 1, canal.	Cubic yards	10	$0.75	$1.00	$1.00
Do	do	241	Dodson North Canal, second unit, schedule 2, canal.	do	10	.75	1.00	1.00
Do	do	241	Dodson North Canal, second unit, schedule 3, structures.	do	10	1.00	1.50	2.00
Montana, Flathead	Sept. 30, 1913	245	Pablo Canals, schedule 1	do	400	.74	.75	.74
Do	do	245	Pablo Canals, schedule 2	do	1,000	.74	.75	.74
Montana, Milk River	Nov. 12, 1913	246	Vandalia South Canal, schedule 1	do	10	.16	.75	.16
Do	do	246	Vandalia South Canal, schedule 2	do	10	.16	1.00	.16
Do	do	246	Vandalia South Canal, schedule 3	do	10	.16	1.00	.16
Do	do	246	Vandalia South Canal, schedule 4, structures	do	10	1.00	3.50	1.00
California, Orland	Oct. 15, 1913	247	East Park feed canal, schedule 1	do	100	.70	.75	.70
Do	do	247	East Park feed canal, schedule 2	do	100	.70	.75	.70
Do	do	247	East Park feed canal, schedule 3	do	10,000	.70	.75	.70
Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir Supply canal, structures, schedule 1.	do	1,000	1.40	1.50	1.40
Do	do	249	do	do	1,000	1.50	1.65	1.65
Do	do	249	Sun River Slope canal, structures, schedule 2	do	200	1.40	1.50	1.40
Do	do	249	Sun River Slope canal, structures, schedule 3	do	500	1.40	1.50	1.40
Montana, Milk River	Apr. 15, 1914 / May 18, 1914	255	St. Mary Canal, schedule 2a	do	5,000	.33	.60	.60
Do	do	255	St. Mary Canal, headworks, schedule 5	do	50	.75	1.00	.75
Do	do	255	St. Mary Canal, bridges, schedule 6	do	5	1.50	1.50	[1]
Do	do	255	St. Mary Canal, Swift Current diversion, schedule 7	do	200	1.00	1.20	1.00
Do	Apr. 15, 1914	255	St. Mary Canal, Kennedy Creek crossing, schedule 9	do	100	1.00	1.50	1.50
Do	do	255	St. Mary Canal, sluice gates, schedule 10	do	10	1.00	1.50	1.50
Do	do	255	St. Mary Canal, Powell Creek crossing, schedule 12	do	10	1.00	1.50	1.50
Do	do	255	St. Mary Canal, crossing, structures, schedule 13	do	50	1.00	1.50	3.00
Do	do	255	St. Mary Canal, Spider Coulee Flume, schedule 14	do	25	1.20	1.50	1.50
Do	do	255	St. Mary Canal, Hall's Coulee crossing, schedule 18	do	5	1.50	3.00	3.00
Do	do	255	St. Mary Canal, drops, schedule 20	do	10	.75	1.00	.75
Do	do	255	St. Mary Canal, near North Fork, Milk, schedule 21	do	10	.75	1.00	.75
Montana, Flathead	Mar. 20, 1914	256	Pablo lateral 31A	do	100	1.25	1.50	2.50
California, Orland	Apr. 21, 1914	259	East Park diversion dam, etc	do	100	1.50	2.00	2.87½
South Dakota, Bellefourche	Apr. 15, 1914	260	North Canal extension, schedule 1	do	150	.147	.194	.147
Do	do	260	North Canal extension, schedule 2	do	50	.147	.210	.147
Do	do	260	North Canal extension, laterals, schedule 3	do	50	.147	.160	.147
Do	do	260	North Canal extension, Deer Creek, laterals, schedule 4.	do	100	.14	.145	.147

Montana, Milk River	May 20, 1914	263	Vandalia South Canal, second unit, laterals	do	10	.14	.50	.14
Do	do	263	Vandalia South Canal, second unit, structures	do	10	1.00	1.25	1.50
Do	May 27, 1914	264	Vandalia Point, structures	do	2,000	.80	.90	1.25
Do	June 10, 1914	265	Dodson South Canal, first and second units, laterals, schedule 1.	do	10	.125	.50	.50
Do	do	265	Dodson South Canal, first and second units, laterals, schedule 2.	do	10	.125	.60	.60
Do	do	265	Dodson South Canal, first and second units, structures, schedule 3.	do	10	1.00	2.00	1.00
Colorado, Grand Valley	June 16, 1914	269	Main Canal, schedule 1, stations 365–420	do	100	.48	.65	.1975
Do	do	269	Main Canal, schedule 2, stations 420–470	do	100	.48	.65	.1975
Do	do	269	Main Canal, schedule 3, stations 470–530	do	100	.48	.65	.1975
Do	do	269	Main Canal, schedule 4, stations 530–580	do	100	.48	.65	.1975
Do	do	269	Main Canal, schedule 5, stations 580–620	do	100	.48	.65	.1975
Do	do	269	Main Canal, schedule 6, stations 620–660	do	2,300	.24	.48	.1975
Do	do	269	Main Canal, schedule 7, stations 660–730	do	6,000	.275	.48	.1975
Do	do	269	Main Canal, schedule 8, stations 730–770	do	100	.48	.65	.1975
Do	do	269	Main Canal, schedule 9, stations 770–820	do	100	.48	.65	.1975
Do	do	269	Main Canal, schedule 10, stations 820–870	do	100	.48	.65	.1975
Do	do	269	Main Canal, schedule 11, stations 870–911+50	do	3,000	.29	.40	.1975
Do	do	269	Main Canal, schedule 12, stations 911+50–970	do	100	.23	.48	.1975
Do	do	269	Main Canal, schedule 13, stations 970–1026	do	500	.25	.48	.1975
Do	do	269	Main Canal, schedule 14, stations 1026–1110	do	5,000	.25	.48	.1975
Do	do	269	Main Canal, schedule 15, stations 1110–1165	do	1,500	.24	.48	.1975
Do	do	269	Main Canal, schedule 16, stations 1165–1220	do	1,500	.28	.40	.1975
Do	do	269	Main Canal, schedule 17, stations 1220–1275	do	100	.48	.65	.1975
Do	do	269	Main Canal, schedule 18, stations 1275–1335	do	2,000	.275	.48	.1975
Do	do	269	Main Canal, schedule 19, stations 1335–1400	do	1,500	.23	.48	.1975
Do	do	269	Main Canal, schedule 20, stations 1400–1454	do	2,000	.265	.48	.1975
Do	do	269	Main Canal, schedule 21, stations 1454–1500	do	1,300	.24	.48	.1975
Do	do	269	Main Canal, schedule 22, stations 1500–1553	do	2,000	.26	.48	.1975
Do	do	269	Main Canal, schedule 23, stations 1553–1600	do	2,000	.25	.48	.1975
Do	do	269	Main Canal, schedule 24, stations 1600–1660	do	2,000	.25	.33	.1975
Do	do	269	Main Canal, schedule 25, stations 1660–1720	do	250	.22	.48	.1975
Do	do	269	Main Canal, schedule 26, stations 1720–1775	do	1,000	.23	.33	.1975
Do	do	269	Main Canal, schedule 27, stations 1775–1825	do	800	.22	.48	.1975
Do	do	269	Main Canal, schedule 28, stations 1825–1875	do	750	.22	.48	.1975
Do	do	269	Main Canal, schedule 29, stations 1875–1933	do	800	.22	.30	.1975

EXCAVATION, WET, CLASS 1.

Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir supply canal, structures	Cubic yards	1,000	$1.00	$1.15	$1.15
Do	do	249	Pishkun Reservoir supply canal, drop at reservoir	do	500	1.00	1.40	1.40
Montana, Milk River	Apr. 15, 1914, and May 18	255	St. Mary Canal, headworks, schedule 5	do	13,000	1.00	1.15	1.15
Do	do	255	St. Mary Canal, crossing structure, schedule 13	do	800	1.50	4.00	1.50
		255	St. Mary Canal, drops, schedule 20	do	600	.75	.80	1.00
California, Orland	Apr. 21, 1914	259	East Park diversion, dam [2]	do	650	.40	.88	.50

[1] All bids rejected.

[2] Class A, all material except solid rock. Lump sum extra for handling water.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, WET, CLASS 2.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Sun River	Dec 18, 1913	249	Pishkun Reservoir supply canal, structures	Cubic yards	500	$1.50	$.65	$1.65
Do	do	249	Pishkun Reservoir supply canal, structures, drop to reservoir.	do	3,000	1.75	1.75	1.75
Montana, Milk River	Apr. 15, 1914, and May 18.	255	St. Mary Canal, headworks, schedule 5	do	1,300	1.50	1.75	1.50
Do	do	255	St. Mary Canal, crossing structure, schedule 13	do	25	3.00	4.50	3.00
Do	do	255	St. Mary Canal, drops, schedule 20	do	50	.60	1.50	.60

EXCAVATION, WET, CLASS 3.

Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir supply canal, structures	Cubic yards	200	$1.90	$2.00	$1.90
Do	do	249	Pishkun Reservoir supply canal, structures, drop to reservoir.	do	2,000	2.40	2.50	2.40
Montana, Milk River	Apr. 15, 1914, and May 18.	255	St Mary Canal, headworks, schedule 5	do	300	2.00	2.50	2.00
Do	do	255	St. Mary Canal, crossing structure, schedule 13	do	5	4.00	5.50	4.00
California, Orland	Apr. 21, 1914	259	East Park diversion, dam 1	do	1,600	1.50	1.60	2.00

FLUMES, METAL, ERECTING.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3, 3 feet 9¾ inches diameter.	Linear feet	514	$0.40	$0.50	$0.40
Do	Nov. 12, 1913	246	Vandalia South Canal, diameter 10 feet 10 inches and 10 feet 2 inches.	do	310	.40	.80	.40
Do	do	246	Vandalia South Canal, diameter 6 feet 5 inches and 5 feet 9 inches.	do	305	.30	.50	.30
Do	do	246	Vandalia South Canal, diameter 3 feet 10 inches and 3 feet 2½ inches.	do	470	.20	.40	.20
Do	Apr. 15, 1914	255	St. Mary Canal, Spider Coulee flume	do	680	1.50	1.75	1.75
Montana, Flathead	Mar. 9, 1914	257	St. Mary Canal, Spider Coulee flume, 8 feet 3½ inches diameter.	do	3,050	.25	.35	.35
Montana, Milk River	May 20, 1914	263	St. Mary Canal, Spider Coulee flume, flumes 3 feet 2 inches and 3 feet 10 inches diameter.	do	320	.40	.50	.40

Do	May 27, 1914	264	St. Mary Canal, Spider Coulee flume, flumes 11 feet 5 inches and 10 feet 10 inches diameter.	do	1,550	.40	.75	1.50
Do	do	264	St. Mary Canal, Spider Coulee flume, flumes 7 feet 0 inches, 6 feet 4 inches and 5 feet 9 inches diameter.	do	130	.30	.35	1.35
Do	June 10, 1914	265	Dodson South Canal, first and second units, 3 feet 2 inches diameter.	do	256	.25	.35	.25
Do	do	265	Dodson South Canal, first and second units, 2 feet 6½ inches diameter.	do	20	.25	.30	.25
Do	do	265	Dodson South Canal, first and second units, 4 feet 5 inches diameter.	do	40	.35	.40	.40
Do	do	265	Dodson South Canal, first and second units, 6 feet 4½ inches diameter.	do	16	.45	.60	.60

FLUMES, METAL, FURNISHING.

Montana, Flathead	Mar. 9, 1914	257	Schedule 1, flume, 8 feet 3½ inches diameter	Linear feet	3,050	$2.04	$2.43	$2.60
Wyoming, Shoshone	do	257	Schedule 2, flume, 2 feet 6½ inches diameter	do	100	.444	.48	.48
Do	do	257	Schedule 2, flume, 10 feet 10 inches diameter	do	293	4.25	4.30	4.30
North Dakota, North Dakota pumping	do	257	Schedule 3, flume, 3 feet 10 inches diameter	do	80	.6425	.70	.70
Montana-North Dakota, Lower Yellowstone.	do	257	Schedule 3, flume, 5 feet 9 inches diameter	do	580	1.25	1.26	1.30
Montana, Milk River	do	257	Schedule 4, flume, 12 fee 9 inches diameter	do	16	7.30	8.15	7.30
Do	do	257	Schedule 4, flume, 12 feet 1 inch diameter	do	589	5.10	5.945	5.10
Do	do	257	do	do	111	5.40	6.10	5.40
Montana, St. Mary Stg	do	257	Schedule 5, flume, 3 feet 10 inches diameter	do	525	.6284	.70	.70
Do	do	257	Schedule 5, flume, 14 feet 4 inches diameter	do	5	7.65	9.80	9.80
Do	do	257	Schedule 5, flume, 13 feet 4½ inches diameter	do	255	7.40	7.50	7.40
Do	do	257	Schedule 5, flume, 6 feet 4½ inches diameter	do	18	1.52	1.65	1.65
Do	do	257	Schedule 5, flume, 4 feet 5½ inches diameter	do	50	.906	1.05	1.05
Do	do	257	Schedule 5, flume, 3 feet 2 inches diameter	do	245	.527	.57	.57
Do	do	257	Schedule 5, flume, 2 feet 6½ inches diameter	do	20	.48	.485	.48
Montana, Milk River	do	257	Schedule 6, flume, 10 feet 10 inches diameter	do	9	3.74	5.00	5.60
Do	do	257	Schedule 6, flume, 10 feet 2 inches diameter	do	305	3.40	3.96	3.96
Do	do	257	Schedule 6, flume, 6 feet 4½ inches diameter	do	5	1.34	1.65	1.65
Do	do	257	Schedule 6, flume, 5 feet 9 inches diameter	do	53	1.25	1.30	1.30
Do	do	257	Schedule 6, flume, 3 feet 10 inches diameter	do	20	.67	.70	.70
Do	do	257	Schedule 6, flume, 3 feet 2 inches diameter	do	702	.52	.532	.57
Do	do	257	Schedule 6, flume, 2 feet 6 inches diameter	do	326	.44	.442	.48

[1] Class B, solid rock. Lump sum extra for handling water.

Unit bids and contract prices on formal specifications—Continued.

GATES AND METAL WORK, PLACING.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir supply canal, schedule 1	Pounds	9,000	$0.01	$0.03	$0.01
Do	do	249	Sun River Slope canal, schedule 2	do	21,000	.01	.0225	.01
Do	do	249	Sun River Slope canal, schedule 3	do	10,000	.01	.02	.01
Montana, Milk River	Apr. 15 and May 18, 1914	255	St. Mary Canal, head works, schedule 5	do	40,000	.02	.03	.02
Do	Apr. 15, 1914	255	St. Mary Canal, check gates, schedule 8	do	11,650	.02	.04	.02
Do	do	255	St. Mary Canal, sluice gates, schedule 10	do	14,500	.02	.04	.02
Do	do	255	St. Mary Canal, control gate, schedule 15	do	11,700	.02	.04	.02
Do	do	255	St. Mary Canal, sluice gate, schedule 17	do	5,650	.02	.04	.02
Do	do	255	St. Mary Canal, near North Fork Milk River, schedule 21.	do	20,000	.02	.03	.02
California, Orland	Apr. 21, 1914	259	East Park diversion dam, etc	do	14,150	.01	.014	.017

GRAVEL, SCREENED.

Montana, Milk River	May 20, 1914	263	Vandalia South Canal, structure	Cubic yards	20	$2.00	$3.40	$4.00
Do	May 27, 1914	264	Vandalia Point, structure	do	1,300	1.50	2.00	1.50

LUMBER, ERECTING.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3, bridges, etc.	Board measure	92,500	$10.00	$14.00	$10.00
Do	do	241	Dodson North Canal, second unit, schedule 3, turnouts, etc.	do	48,000	15.00	21.00	15.00
Do	Nov. 12, 1913	246	Vandalia South Canal, for bridges, etc	do	70,000	15.00	20.00	15.00
Do	do	246	Vandalia South Canal, for turnouts, etc	do	60,000	20.00	25.00	20.00
Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir, supply canal, schedule 1	do	30,000	24.00	25.00	25.00
Do	do	249	Sun River, slope canal, schedule 2	do	25,000	24.00	27.00	35.00
Do	do	249	Sun River slope canal, schedule 3	do	11,000	24.00	27.50	48.00
Montana, Milk River	Apr. 15 and May 18, 1914	255	St. Mary Canal, schedule 2a, wooden diaphragm	do	33,000	20.00	30.00	20.00
Do	do	255	St. Mary Canal, head works, schedule 5	do	69,620	10.00	12.50	10.00
Do	do	255	St. Mary Canal, bridges, schedule 6	do	113,000	25.00	26.70	(1)
Do	do	255	St. Mary Canal, crossing structure, schedule 13	do	6,000	15.00	20.00	20.00
Do	do	255	St. Mary Canal, Spider Coulee flume, schedule 14	do	83,400	28.00	30.00	28.00

Montana, Flathead	Mar. 20, 1914	256	Pablo lateral, 31A, permanent timbering	do	26,000			[2] 40.00
Do	Mar. 9, 1914	257	Trestle for metal flume	do	110,000	20.00	21.00	21.00
California, Orland	Apr. 21, 1914	259	East Park division dam, etc	do	30,500	25.00	30.00	33.70
Montana, Milk River	May 20, 1914	263	Vandalia South Canal, laterals, bridges, etc	do	85,000	15.00	20.00	20.00
Do	do	263	Vandalia South Canal, laterals, turnouts, etc	do	50,000	19.00	25.00	25.00
Do	May 27, 1914	264	Vandalia Point structure	do	115,000	10.00	15.00	16.00
Do	June 10, 1914	265	Dodson South Canal, bridges and flumes	do	100,000	12.00	15.00	12.00
			Dodson South Canal, turnouts, etc	do	50,000	20.00	32.00	20.00

OVERHAUL.[2]

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 1	Sta. yards	10,000			$0.02
Do	do	241	Dodson North Canal, second unit, schedule 2	do	1,000			.02
Montana, Sun River	Sept. 30, 1913	245	Pablo Canals, schedule 1	do	10,000			.02
Do	do	245	Pablo Canals, schedule 2	do	10,000			.02
Montana, Milk River	Nov. 12, 1913	246	Vandalia South Canal, schedule 1	do	20,000			.02
Do	do	246	Vandalia South Canal, schedule 2	do	40,000			.02
Do	do	246	Vandalia South Canal, schedule 3	do	10,000			.02
California, Orland	Oct. 15, 1913	247	East Park feed canal, schedule 1	do	1,000			.02
Do	do	247	East Park feed canal, schedule 2	do	1,000			.02
Do	do	247	East Park feed canal, schedule 3	do	1,000			.02
Montana, Milk River	{Apr. 15, 1914 {May 18, 1914	255	St. Mary Canal, schedule 2a	do	346,560			.02
Do	do	255	St. Mary Canal, headworks, schedule 5	do	25,000			.02
Do	do	255	St. Mary Canal, Kennedy Creek dikes, 11	do	10,000			.02
Do	Apr. 15, 1914	255	St. Mary Canal, Powell Creek crossing, 12	do	1,000			.02
Do	do	255	St. Mary Canal near North Fork Milk, 21	do	50,000			.02
Montana, Flathead	Mar. 29, 1914	256	Pablo lateral, 31A	do	2,000			.02
California, Orland	Apr. 21, 1914	259	East Park Diversion dam, etc	do	1,000			.02
South Dakota, Bellefourche	Apr. 15, 1914	260	North Canal extension, schedule 1	do	17,000			.02
Do	do	260	North Canal extension, schedule 2	do	2,800			.02
Do	do	260	North Canal extension, laterals, schedule 3	do	2,000			.02
Montana, Milk River	May 12, 1914	262	Vandalia spillway channel, etc	do	5,000			.02
Do	May 20, 1914	263	Vandalia South Canal, second unit, laterals	do	25,000			.02
Do	do	263	Vandalia South Canal, second unit, structures	do	1,000			.02
Do	May 27, 1914	264	Vandalia Point structure	do	5,000			.02
Do	June 10, 1914	265	Dodson South Canal, first and second units, laterals, schedule 1.	do	4,000			.02
Do	do	265	Dodson South Canal, first and second units, laterals, schedule 2.	do	16,000			.02
Colorado, Grand Valley	June 16, 1914	269	Main Canal, schedule 1, stations 365–420	do	3,000			.02
Do	do	269	Main Canal, schedule 2, stations 420–470	do	4,000			.02
Do	do	269	Main Canal, schedule 3, stations 470–580	do	10,000			.02
Do	do	269	Main Canal, schedule 4, stations 530–580	do	100			.02
Do	do	269	Main Canal, schedule 5, stations 580–620	do	100			.02
Do	do	269	Main Canal, schedule 6, stations 620–660	do	10,000			.02
Do	do	269	Main Canal, schedule 7, stations 660–730	do	90,000			.02
Do	do	269	Main Canal, schedule 8, stations 730–770	do	4,000			.02

[1] All bids rejected.

[2] Price fixed in specifications.

Unit bids and contract prices on formal specifications—Continued.

OVERHAUL—Continued.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Colorado Grand Valley	June 16, 1914	269	Main Canal, schedule 9, stations 770–820	Sta. yards	100			$0.02
Do	do	269	Main Canal, schedule 10, stations 820–870	do	2,000			.02
Do	do	269	Main Canal, schedule 11, stations 870–911+50	do	100			.02
Do	do	269	Main Canal, schedule 12, stations 911+50–970	do	4,000			.02
Do	do	269	Main Canal, schedule 13, stations 970–1036	do	1,000			.02
Do	do	269	Main Canal, schedule 14, stations 1026–1110	do	75,000			.02
Do	do	269	Main Canal, schedule 15, stations 1110–1165	do	20,000			.02
Do	do	269	Main Canal, schedule 16, stations 1165–1220	do	6,000			.02
Do	do	269	Main Canal, schedule 17, stations 1220–1275	do	10,000			.02
Do	do	269	Main Canal, schedule 18, stations 1275–1335	do	40,000			.02
Do	do	269	Main Canal, schedule 19, stations 1335–1400	do	25,000			.02
Do	do	269	Main Canal, schedule 20, stations 1400–1454	do	50,000			.02
Do	do	269	Main Canal, schedule 21, stations 1454–1500	do	35,000			.02
Do	do	269	Main Canal, schedule 22, stations 1500–1553	do	25,000			.02
Do	do	269	Main Canal, schedule 23, stations 1553–1600	do	20,000			.02
Do	do	269	Main Canal, schedule 24, stations 1600–1660	do	100			.02
Do	do	269	Main Canal, schedule 25, stations 1660–1720	do	2,000			.02
Do	do	269	Main Canal, schedule 26, stations 1720–1775	do	6,000			.02
Do	do	269	Main Canal, schedule 27, stations 1775–1825	do	27,000			.02
Do	do	259	Main Channel, schedule 28, stations 1825–1775	do	36,000			.02
Do	do	269	Main Channel, schedule 29, stations 1875–1933	do	4,000			.02

PAVING, DRY.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3	Cubic yards	350	$2.50	$3.00	$6.00
Do	Nov. 12, 1913	246	Vandalia South Canal	Square yards	50	1.75	3.00	1.75
Do	Apr. 15, 1914 May 18, 1914	225	St. Mary Canal, headworks, 18 inches St. Mary Canal, headworks, 21 inches	do	1,200	1.25	1.50	1.25
Do	do	255	St. Mary Canal, Swift Current diversion, 21 inches	do	7,680	1.25	1.50	1.25
Do	Apr. 15, 1914	255	St. Mary Canal, check gates, 18 inches	do	165	1.10	1.25	1.10
Do	do	255	St. Mary Canal, Kennedy Creek crossing, 18 inches, schedule 9.	do	50	1.00	1.25	1.00
Do	do	255	St. Mary Canal, sluice gates, 18 inches, schedule 10.	do	20	1.25	2.00	1.25
Do	Apr. 15, 1914 May 18, 1914	255	St. Mary Canal, Kennedy Creek dikes, 21 inches, schedule 11.	do	800	1.00	1.00	1.00

Do	Apr. 15, 1914	255	St. Mary Canal, Powell Creek Crossing, 18 inches, schedule 12.	do	150	1.50	2.00	1.50
Do	do	255	St. Mary Canal, Spider Coulee flume, 18 inches, schedule 14.	do	160	1.40	2.50	1.40
Do	do	255	St. Mary Canal, control gate, 18 inches, schedule 15.	do	165	1.75	2.00	1.75
Do	do	255	St. Mary Canal, Cow Creek crossing, 18 inches, schedule 16.	do	40	1.75	2.00	1.75
Do	do	255	St. Mary Canal, sluice gate, 18 inches, schedule 17.	do	40	1.75	2.25	1.75
Do	do	255	St. Mary Canal, Halls Coulee crossing, 18 inches, schedule 18.	do	100	1.75	2.25	1.75
Do	do	255	St. Mary Canal, pipe culverts, 18 inches, schedule 19	do	60	1.75	2.00	1.75
Do	do	255	St. Mary Canal, drops (18 inches), schedule 20	do	400	1.60	2.25	2.75
Do	do	255	St. Mary Canal, near North Fork Milk River (24 inches), schedule 21.	do	2,560	2.50	3.50	2.50
Do	do	255	St. Mary Canal culverts, schedule 22	do	40	1.25	1.50	1.50
California, Orland	Apr. 21, 1914	259	East Park division dam, etc	Cubic yards	16	1.00	2.30	2.30
Montana, Milk River	June 10, 1914	265	Dodson South Canal, structure	do	600	1.75	2.15	2.15
Oregon, Umatilla	May 28, 1914	268	Three Mile Falls dam	do	125	1.75	2.00	1.75

PAVING, GROUTED.

Montana, Milk River	Nov. 12, 1913	246	Vandalia South Canal, schedule 4	Square yards	50	$2.00	$4.00	$2.00
Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir Supply canal, schedule 1	do	1,200	1.50	2.25	2.25
Do	do	249	Sun River Slope canal, schedule 2	do	875	1.50	2.25	2.25
Do	do	249	Sun River Slope canal, schedule 3	do	325	1.50	2.25	2.25
Montana, Milk River	Apr. 15 and May 18, 1914.	255	St. Mary Canal, headworks, schedule 5	do	500	2.00	2.10	2.00
Do	Apr. 15, 1914	255	St. Mary Canal, check gates, schedule 8	do	165	1.65	2.00	1.65
Do	do	255	St. Mary Canal, Kennedy Creek crossing, schedule 9	do	1,230	1.10	2.00	1.10
Do	do	255	St. Mary Canal, sluice gates, schedule 10	do	630	1.35	2.00	1.35
Do	do	255	St. Mary Canal, Powell Creek crossing, schedule 12.	do	150	1.65	2.00	1.65
Do	do	255	St. Mary Canal, crossing structure, schedule 13	do	200	1.75	2.00	1.75
Do	do	255	St. Mary Canal, Spider Coulee flume, schedule 14.	do	160	1.90	2.00	1.90
Do	do	255	St. Mary Canal, control gate, schedule 15	do	165	2.25	3.00	2.25
Do	do	225	St. Mary Canal, Cow Creek crossing, schedule 16	do	60	2.00	2.25	2.25
Do	do	255	St. Mary Canal, sluice gate, schedule 17	do	330	2.25	3.50	2.25
Do	do	255	St. Mary Canal, Halls Coulee crossing, schedule 18.	do	200	2.25	3.50	2.25
Do	do	255	St. Mary Canal, pipe culverts, schedule 19	do	60	2.25	2.50	2.25
Do	do	255	St. Mary Canal, drops, schedule 20	do	900	2.00	2.10	4.00
Do	do	255	St. Mary Canal, culverts, schedule 22	do	60	1.75	2.00	1.75
Do	May 20, 1914	263	Vandalia South Canal, second unit structure	do	100	1.50	1.90	3.00
Do	June 10, 1914	265	Dodson South Canal, structure	do	1,400	2.00	2.65	2.65

Unit bids and contract prices on formal specifications—Continued.

PAVING, RUBBLE CONCRETE.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3	Cubic yards	560	$3.50	$4.50	$7.00
Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir Supply canal, schedule 1	do	400	3.00	3.00	3.00
Do	do	249	Sun River slope canal, schedule 3	do	225	3.00	5.00	3.00

PILES, ROUND, DRIVING.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3	Linear feet	150	$0.40	$1.00	$1.00
Do	Nov. 12, 1913	246	Vandalia South Canal	do	375	.50	1.00	.50
Do	May 20, 1914	263	Vandalia South Canal, laterals	do	120	.40	1.00	1.00
Do	May 27, 1914	264	Vandalia Point, structure	do	1,600	.40	.60	.40
Do	June 10, 1914	265	Dodson South Canal, structure	do	180	.70	1.00	.70

PIPE, CAST-IRON.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3, 18 inches.	Linear feet	204	$0.35	$0.60	$0.60
Do	do	241	Dodson North Canal, second unit, schedule 3, 24 inches.	do	72	.60	1.00	1.00

PIPE, CONCRETE, LAYING.

Montana, Milk River	Apr. 15, 1914	255	St. Mary Canal, culverts, 30 inches, schedule 19	Linear feet	520	$0.40	$0.50	$0.40
Do	do	255	St. Mary Canal, drops, 12 inches, schedule 20	do	125	.10	.20	.50
Do	do	255	St. Mary Canal, culverts, 30 inches, schedule 22	do	130	.40	.50	.40

PIPE, CORRUGATED IRON, LAYING.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3, 36 inches.	Linear feet	160	$0.40	$0.50	$0.50
Do	do	241	Dodson North Canal, second unit, schedule 3, 48 inches.	do	100	.60	.70	.60
Do	Nov. 12, 1913	246	Vandalia South Canal, 24 inches	do	70	.40	.40	.40
Do	do	246	Vandalia South Canal, 30 inches	do	82	.50	.50	.50
Do	do	246	Vandalia South Canal, 36 inches	do	190	.60	.60	.60
Do	May 20, 1914	263	Vandalia South Canal, laterals, 12 inches	do	40	.20	.25	.20
Do	do	263	Vandalia South Canal, laterals, 24 inches	do	100	.38	.40	.40
Do	do	263	Vandalia South Canal, laterals, 36 inches	do	300	.50	.65	.90
Do	May 27, 1914	264	Vandalia Point structures, 12 inches	do	130	.12	.15	.12
Do	June 10, 1914	265	Dodson South Canal structures, 48 inches	do	60	.35	.40	.35

PIPE, VITRIFIED, LAYING.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3, 12 inches.	Linear feet	124	$0.15	$0.25	$0.15
Do	do	241	Dodson North Canal, second unit, schedule 3, 18 inches.	do	72	.30	.50	.30
Do	do	241	Dodson North Canal, second unit, schedule 3, 24 inches.	do	268	.50	.75	.50
Do	do	241	Dodson North Canal, second unit, schedule 3, 30 inches.	do	172	.70	.75	.70
Do	Nov. 12, 1913	246	Vandalia South Canal, 12 inches	do	300	.20	.25	.20
Do	do	246	Vandalia South Canal, 18 inches	do	825	.30	.30	.30
Do	do	246	Vandalia South Canal, 20 inches	do	110	.40	.40	.40
Do	do	246	Vandalia South Canal, 24 inches	do	585	.50	.65	.65
Do	do	246	Vandalia South Canal, 30 inches	do	488	.70	.90	.90
Do	do	246	Vandalia South Canal, 36 inches	do	550	.80	1.10	1.10
Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir Supply canal, schedule 1, 6 inches.	do	1,200	.20	.20	.20
Do	do	249	Sun River Slope canal, schedule 2, 6 inches	do	20,000	.17	.20	.20
Do	do	249	Sun River Slope canal, schedule 3, 6 inches	do	27,000	.20	.35	.20
Montana, Milk River	Apr. 15, 1914	255	St. Mary Canal, drops, 12 inches	do	125	.40	.50	.50
Do	May 20, 1914	263	Vandalia South Canal, laterals, 12 inches	do	90	.20	.30	.20
Do	do	263	Vandalia South Canal, laterals, 18 inches	do	200	.30	.40	.30
Do	do	263	Vandalia South Canal, laterals, 24 inches	do	155	.50	.60	.70
Do	do	263	Vandalia South Canal, laterals, 30 inches	do	70	.60	.80	1.00
Do	do	263	Vandalia South Canal, laterals, 36 inches	do	25	.75	1.25	1.25
Do	May 27, 1914	264	Vandalia Point structure, 10 inches	do	2,000	.05	.12	.12
Do	June 10, 1914	265	Dodson South Canal, structure, 12 inches	do	575	.20	.30	.20
Do	do	265	Dodson South Canal, structure, 18 inches	do	670	.30	.45	.30
Do	do	265	Dodson South Canal, structure, 24 inches	do	190	.40	.50	.50
Do	do	265	Dodson South Canal, structure, 30 inches	do	853	.50	.75	.75

Unit bids and contract prices on formal specifications—Continued.

PUDDLING.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3	Cubic yards	300	$0.40	$0.50	$0.50
Do	Nov. 12, 1913	246	Vandalia South Canal	do	200	.40	.75	.40
Montana, Sun River	Dec. 18, 1913	249	Pishkun Reservoir supply canal, schedule 1	do	7,000	.60	.65	.60
Do	do	249	Sun River Slope canal, schedule 2	do	7,000	.35	.60	.60
Do	do	249	Sun River Slope canal, schedule 3	do	7,500	.35	.60	.60
Montana, Milk River	Apr. 15 and May 18, 1914	255	St. Mary Canal, headworks, schedule 5	do	340	.30	.50	.30
Do	Apr. 15, 1914	255	St. Mary Canal, check gates, schedule 8	do	110	.30	.50	.30
Do	do	255	St. Mary Canal, Kennedy Creek crossing, schedule 9	do	2,500	.25	.50	.25
Do	do	255	St. Mary Canal, sluice gates, schedule 10	do	240	.40	.50	.40
Do	do	255	St. Mary Canal, Powell Creek crossing, schedule 12	do	550	.25	.50	.25
Do	do	255	St. Mary Canal, crossing structure, schedule 13	do	1,300	.45	.50	.45
Do	do	255	St. Mary Canal, Spider Coulee flume, schedule 14	do	365	.50	.60	.60
Do	do	255	St. Mary Canal, control gate, schedule 15	do	110	.35	.50	.35
Do	do	255	St. Mary Canal, Cow Creek crossing, schedule 16	do	500	.40	.50	.40
Do	do	255	St. Mary Canal, sluice gate, schedule 17	do	60	.50	.60	.60
Do	Apr. 15, 1914	255	St. Mary Canal, Halls Coulee crossing, schedule 18	do	350	.50	.60	.60
Do	do	255	St Mary Canal, pipe culverts, schedule 19	do	140	.50	.60	.60
Do	do	255	St. Mary Canal, drops, schedule 20	do	1,500	.10	.50	.10
Do	do	255	St. Mary Canal, near North Fork Milk, schedule 21	do	500	.10	.50	.10
Do	do	255	St. Mary Canal, culverts, schedule 22	do	40	.50	.60	.60
California, Orland	Apr. 21, 1914	259	East Park diversion dam, etc	do	50	.10	.50	.10
Montana, Milk River	May 20, 1914	263	Vandalia South Canal, second unit, structures	do	1,000	.50	.60	.50
Do	May 27, 1914	264	Vandalia Point structure	do	750	.30	.40	.30
Do	June 10, 1914	265	Dodson South Canal, structure	do	200	.35	.50	.35

RIPRAP.

Montana, Milk River	Apr. 15, 1914, and May 18	255	St. Mary Canal, headworks, schedule 5	Cubic yards	600	$1.50	$2.00	$1.50
Do	do	255	St. Mary Canal, Kennedy Creek dikes, schedule 11	do	1,700	1.50	1.50	1.50
Do	do	255	St. Mary Canal, crossing structures, schedule 13	do	150	1.50	2.50	2.50
Do	June 10, 1914	265	Dodson South Canal, structures, schedule 3	do	860	3.00	4.00	3.00

STEEL REINFORCING BARS, FURNISHING.[1]

Montana, Milk River	Jan. 20, 1914	252	Schedule 1, Vandalia Dam, 1¼ inches, square	Pounds	104,115	$0.0115	$0.012	$0.013
Do	do	252	Schedule 1, Vandalia Dam, 1 inch, square	do	19,040	.0115	.012	.013
Do	do	252	Schedule 1, Vandalia Dam, ¾ inch, square	do	91,060	.0115	.012	.013
Do	do	252	Schedule 1, Vandalia Dam, ⅝ inch, square	do	76,490	.012	.0125	.0135
Do	do	252	Schedule 1, Vandalia Dam, ½ inch, square	do	89,080	.0125	.013	.014
Montana, Sun River	do	252	Schedule 2, 1-inch square bars	do	14,420	.0115	.012	.013
Do	do	252	Schedule 2, ⅞-inch square bars	do	69,400	.0115	.012	.013
Do	do	252	Schedule 2, ¾-inch square bars	do	145,770	.0115	.012	.013
Do	do	252	Schedule 2, ⅝-inch square bars	do	14,475	.012	.0125	.0135
Do	do	252	Schedule 2, ½-inch square bars	do	71,230	.0125	.013	.014
Montana, Flathead	do	252	Schedule 3, ½-inch square bars	do	63,750	.0125	.013	.014
Idaho, Boise	do	253	Arrowrock Dam, ¾-inch twisted bars	do	490,000	.012	.013	.013
All	Apr. 15, 1914	261	Square, cold twisted, ¼ inch	do	34,000	.0169	.017	.0169
Do	do	261	Square, cold twisted, ⅜ inch	do	141,165	.0139	.0144	.0139
Do	do	261	Square, cold twisted, ½ inch	do	1,491,900	.0124	.0129	.0124
Do	do	261	Square, cold twisted, ⅝ inch	do	327,620	.0114	.0124	.0119
Do	do	261	Square, cold twisted, ¾ inch	do	381,975	.0114	.0119	.0114
Do	do	261	Square, cold twisted, ⅞ inch	do	21,310	.0114	.0119	.0114
Do	do	261	Square, cold twisted, 1 inch	do	131,610	.0114	.0119	.0114
Do	do	261	Square, cold twisted, 1¼ inches	do	2,040	.0114	.0119	.0114
Do	do	261	Square, cold twisted, 1½ inches	do	79,000	.0114	.0119	.0114

STEEL, REINFORCING, PLACING.

Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3	Pounds	100,000	$0.01	$0.0125	$0.01
Do	Nov. 12, 1913	246	Vandalia South Canal	do	250,000	.01	.02	.01
Montana, Sun River	Dec. 18, 1913	249	Pishkun Supply canal, schedule 1	do	244,000	.015	.02	.015
Do	do	249	Sun River Slope canal, schedule 2	do	155,000	.015	.02	.015
Do	do	249	Sun River Slope canal, schedule 3	do	265,000	.0125	.015	.0125
Montana, Milk River	Apr. 15, 1914, and May 18	255	St. Mary Canal, headworks, schedule 5	do	84,000	.015	.02	.015
Do	Apr. 15, 1914	255	St. Mary Canal, check gates, schedule 8	do	9,000	.0175	.02	.0175
Do	do	255	St. Mary Canal, Kennedy Creek crossing, schedule 9	do	70,000	.01	.015	.01
Do	do	255	St. Mary Canal, sluice gates, schedule 10	do	12,000	.01	.015	.01
Do	do	255	St. Mary Canal, Powell Creek crossing, schedule 12	do	20,000	.01	.015	.01
Do	do	255	St. Mary Canal, crossing structure, schedule 13	do	54,000	.0175	.02	.0175
Do	do	255	St. Mary Canal, Spider Coulee flume, schedule 14	do	18,500	.0175	.02	.0175
Do	do	255	St. Mary Canal, control gate, schedule 15	do	9,000	.02	.0225	.02
Do	do	255	St. Mary Canal, Cow Creek crossing, schedule 16	do	20,000	.02	.025	.02
Do	do	255	St. Mary Canal, sluice gate, schedule 17	do	18,000	.02	.0225	.02
Do	do	255	St. Mary Canal, Halls Coulee crossing, schedule 18	do	26,500	.02	.0225	.02
Do	do	255	St. Mary Canal, pipe culverts, schedule 19	do	2,000	.02	.025	.02
Do	do	255	St. Mary Canal, drops, schedule 20	do	142,000	.015	.016	.015
Do	do	255	St. Mary Canal, near North Fork Milk River, schedule 21.	do	500	.015	.02	.015
Do	do	255	St. Mary Canal, culverts, schedule 22	do	750	.0125	.02	.0125

[1] F. o. b. manufactory.

Unit bids and contract prices on formal specifications—Continued.

STEEL, REINFORCING, PLACING—Continued.

State and project.	Date.	Specification number.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
California, Orland	Apr. 21, 1914	259	East Park diversion dam, etc	Pounds	49,300	$0.0075	$0.014	$0.017
Montana, Milk River	May 20, 1914	263	Vandalia South Canal, second unit structure	do	18,000	.015	.02	.015
Do	May 27, 1914	264	Vandalia Point structure	do	160,000	.01	.0125	.0125
Do	June 10, 1914	265	Dodson South Canal, structures	do	260,000	.0125	.015	.0125
Oregon, Umatilla	May 28, 1914	268	Three Mile Falls Dam	do	36,000	.005	.01	.025
STEEL, STRUCTURAL, PLACING.								
Montana, Milk River	Aug. 6, 1913	241	Dodson North Canal, second unit, schedule 3	Pounds	6,500	$0.02	$0.03	$0.02
Do	Nov. 12, 1913	246	Vandalia South Canal	do	5,000	.02	.03	.02
Do	May 20, 1914	263	Vandalia South Canal, laterals	do	600	.02	.03	.02
Do	May 27, 1914	264	Vandalia Point, structures	do	3,500	.015	.02	.03
Do	June 10, 1914	265	Dodson South Canal, structure	do	12,500	.02	.02½	.02½
TUNNEL.								
Montana, Flathead	Mar. 20, 1914	256	Pablo lateral 31A (approximately 5 feet diameter), in earth with lining.	Linear feet	130	$31.00	$33.12	$38.00
Do	do	256	Pablo lateral 31A (approximately 5 feet diameter), in rock with lining.	do	40	22.00	25.00	22.00
Do	do	256	Pablo lateral 31A (approximately 5 feet diameter), in rock without lining.	do	350	14.00	20.00	14.00
Do	do	256	Pablo lateral 31A (approximately 5 feet diameter), permanent timbering.	M feet b. m	26			[1] 40.00
Do	do	256	Pablo lateral 31A (approximately 5 feet diameter), addition concrete lining.	Cubic yards	25	10.00	16.00	16.00
WATER, HANDLING.								
California, Orland	Apr. 21, 1914	259	East Park diversion dam	Lump sum		$2,103.00	$2,200.00	$2,103.00
Oregon, Umatilla	May 28, 1914	268	Three Mile Falls dam	do		680.00	900.00	900.00

[1] Price fixed in bid.

ENGINEERING DATA FOR PROJECTS ON COMPLETION

RESERVOIRS.

Projects.	Name.	Area.	Capacity.	Spillways.	
				Length.	Elevation above stream bed.
		Acres.	*Acre-feet.*	*Feet.*	*Feet.*
Arizona: Salt River	Roosevelt	16,832	1,367,300	400	[1]225
Arizona-California: Yuma	Laguna diversion	6,400	.....	.....	.....
California: Orland	East Park	1,850	51,000	415	88
Colorado: Uncompahgre Valley	Taylor Park	2,260	106,000	125	150
Idaho: Boise	Deer Flat	9,835	177,640	None.	.....
Do	Arrowrock	2,780	230,000	400	256
Minidoka	Lake Walcott	11,350	[2]150,000	2,385	42
Do	Jackson Lake	25,530	789,000	160	41
Montana: Blackfeet	Two Medicine Lake	854	16,000	66	25½
Do	Spring Lake	1,400	29,000	50	45
Do	Four Horns	1,867	60,640	50	57
Flathead	Big Draw	901	9,330	100	25
Do	Dog Lake	160	3,200	.....	30
Do	Dry Fork	250	1,918	100	25
Do	Flathead Lake	107,000	1,800,000	1,000	180
Do	Hubbart	480	20,000	50	108
Do	Kickinghorse	675	6,800	.....	23
Do	Little Bitter Root Lake	3,000	6,000	20	3
Do	Lower Crow Creek	300	9,485	100	82
Do	McConnell	100	2,000	.....	40
Do	McDonald Lake	220	10,600	200	51
Do	Mission	300	8,300	100	74
Do	Ninepipe	1,630	15,100	None.	[3]30
Do	Pablo	2,100	29,600	None.	[3]36
Do	Polson	70	1,700	.....	80
Do	St. Marys Lake	300	25,000	50	52
Do	Twin	70	937	.....	25
Fort Peck	Little Porcupine	390	3,900	.....	.....
Do	Big Porcupine	750	9,400	.....	.....
Do	Poplar River	2,600	31,000	.....	.....
Do	Wolf Creek	350	4,550	.....	.....
Do	Smoke Creek	300	5,300	.....	.....
Huntley	Highline	53	853	None.	.....
Milk River	St. Mary Lakes	6,910	124,000	500	15
Do	Sherburne Lakes	2,000	75,000	200	70
Do	Nelson Reservoir	6,021	132,670	None.	None.
Sun River	Willow Creek	2,696	86,000	200	100
Do	Sun River Storage	3,540	269,000	580	321
Do	Pishkun	1,542	45,700	Under control.	
Do	Muddy Creek	1,828	33,000	400	80
Do	Benton Lake	9,300	144,000	Under control.	
Nebraska-Wyoming: North Platte	Pathfinder	22,700	1,070,000	660	184
Do	Reservoir No. 1, Lake Alice.	900	11,400	100	18
Do	Lake Minitare	2,240	67,025	100	55
Nevada: Truckee-Carson	Lake Tahoe	125,000	750,000	85	6
Do	Alkali Flat	8,500	88,000	.....	.....
Do	Lahontan	11,000	290,000	500	112
New Mexico: Carlsbad	Avalon	970	7,000	1,000	21
Do	McMillan	6,250	70,000	2,700	23 to 26
Hondo	Hondo	1,910	40,000	None.	.....
New Mexico-Texas: Rio Grande	Elephant Butte	40,080	2,627,700	300	193
Oklahoma: Lawton	Lake Lawtonka	1,080	14,000	257	50
Oregon: Umatilla	Cold Springs	1,500	50,000	330	90
Oregon-California: Klamath	Upper Klamath Lake	60,000	264,000	.....	.....
Do	Clear Lake	25,000	462,000	357	24
South Dakota: Belle Fourche	Belle Fourche	8,010	203,770	314	100
Utah: Strawberry Valley	Strawberry Valley	8,200	278,000	60	60
Washington: Okanogan	Salmon Lake	200	2,600	None.	.....
Do	Conconully	460	13,000	180	55
Yakima	Bumping Lake	1,350	34,000	235	36
Do	Lake Cle Elum	4,680	490,000	660	116
Do	Lake Kachess	4,800	210,000	250	53
Do	McAllister Meadow	1,800	183,000	225	186
Do	Lake Keechelus	2,550	152,000	300	60
Do	Clear Creek	150	3,000	200	35
Wyoming: Shoshone	Shoshone	6,600	470,000	300	233
Do	Ralston	200	2,100	None.	.....
Total		582,474	13,743,518	.....	.....

[1] See notes under storage dams.
[2] 53,500 acre-feet available.
[3] Drainage limited; elevation that of water surface.

STORAGE DAMS.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
			Feet.	*Feet.*	*Cubic yds.*
Arizona: Salt River	Roosevelt [1]	Rubble masonry arch, gravity.	280	1,125	342,325
California: Orland	East Park [1]	Concrete arch, gravity	139	250	12,200
Colorado:					
Uncompahgre Valley.	Taylor Park	Undetermined	200	(2)	(2)
Idaho:					
Boise	Upper Deer Flat [1]	Earth fill	70	4,000	1,170,200
Do	Lower Deer Flat [1]	do	40	7,200	1,130,800
Do	Deer Flat Forest [1]	do	16	950	22,500
Do	Arrowrock [3]	Rubble, concrete arch	350	1,075	530,000
Minidoka	Minidoka [1]	Rockfill, concrete core	86	937	242,500
Do	Jackson Lake [3]	Massive concrete gate section and earth fill. (See note.)	67	5,000	320,000
Montana:					
Blackfeet	Two Medicine [1]	Earth, embankment	36	900	28,600
Do	Spring Lake	do	50	1,500	75,000
Do	Four Horns	do	62	2,225	149,000
Flathead	Big Draw	Earth	35	3,600	137,000
Do	Dog Lake	Loose rock and earth	35	2,250	67,000
Do	Dry Fork	Earth	33	1,860	130,000
Do	Newell	Concrete	170	850	100,000
Do	Hubbart	Loose rock and earth	118	450	302,000
Do	Kickinghorse	Earth	31	3,700	181,000
Do	Little Bitter Root Lake.	do	10	300	4,000
Do	Lower Crow Creek	do	92	860	330,000
Do	McConnell	do	45	1,130	71,000
Do	McDonald Lake	Loose rock and earth	57	1,500	214,000
Do	Mission	do	80	2,500	346,000
Do	Ninepipe	Earth	38	2,180	162,000
Do	Pablo [3]	do	46	14,000	1,028,000
Do	Polson	do	85	1,100	170,000
Do	St. Marys Lake	Loose rock and earth	58	2,200	140,000
Do	Twin	Earth	30	1,600	46,000
Fort Peck	Little Porcupine [1]	Earth and brush mattress			43,400
Do	Big Porcupine	Earth fill			227,000
Do	Poplar River	do			830,000
Do	Wolf Creek	do			85,300
Do	Smoke Creek	do			75,600
Huntley	Highline	do	53	1,330	151,350
Milk River	St. Mary Lakes	Earth embankment	30	2,000	135,000
Do	Sherburne Lakes	do	80	850	215,000
Do	Nelson Reservoir	do	38	20,730	1,016,000
Sun River	Willow Creek [4]	Earth fill	110	1,045	452,000
Do	Sun River storage	Masonry	329	989	296,500
Do	Pishkun	Earth fill	48	8,600	444,000
Do	Muddy Creek	do	90	800	440,000
Do	Benton Lake	do	40	240	12,000
Nebraska-Wyoming:					
North Platte	Pathfinder [1]	Broken range masonry arch	218	432	60,210
Do	Pathfinder Dike [1]	Earth fill	40	1,650	152,000
Do	Dam No. 1 [1]	do	30	3,100	240,000
Do	Dam No. 1½ [1]	do	23	2,550	119,000
Do	Minitare [3]	do	65	3,600	570,000
Nevada:					
Truckee-Carson	Lake Tahoe [1]	Concrete sluiceway regulator	14	109	425
Do	Alkali Flat	Not designed			
Do	Lahontan [3]	Earth and gravel fill	129	1,700	770,000
New Mexico:					
Carlsbad	Avalon [1]	Earth and rock fill, concrete core.	50	1,380	179,491
Do	McMillan [1]	Earth and rock fill	55	1,686	153,318
Hondo	Hondo [1]	6-earth embankments	25	16,200	637,880
New Mexico-Texas:					
Rio Grande	Elephant Butte [3]	Rubble concrete, gravity structure, straight.	290	1,200	500,000
Do	Elephant Butte Dike	Earth fill	42	1,875	

[1] Completed.
[2] Not designed.
[3] Under construction.
[4] Completed to height of 70 feet.

STORAGE DAMS—Continued.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
Oklahoma: Lawton	Medicine Bluff	Rubble masonry	55	357	9,500
Oregon: Umatilla	Cold Springs [1]	Earth fill	98	3,800	789,500
Oregon - California : Klamath.	Clear Lake [1]	Rock fill	33	790	56,600
South Dakota: Belle Fourche.	Belle Fourche [1]	Earth fill	115	6,200	1,600,000
Utah: Strawberry Valley.	Strawberry [1]	Earth fill, reinforced concrete core.	72	488	108,415
Washington:					
Okanogan	Salmon Lake [1]	Concrete headworks			
Do	Conconully [1]	Hydraulic earth fill	64	1,000	336,000
Yakima	Bumping Lake [1]	Earth fill	45	3,425	233,852
Do	Lake Clealum	do	125	1,150	617,000
Do	Lake Kachess [1]	Earth and gravel fill	63	1,400	182,150
Do	McAllister	Meadow earth and rock fill	200	950	1,200,000
Do	Lake Keechelus [2]	Earth and gravel fill	70	6,500	522,000
Do	Clear Creek [2]	Single arch, concrete	35	161	2,500
Wyoming:					
Shoshone	Shoshone [1]	Rubble, concrete arch	328	200	75,576
Do	Ralston [1]	Earth fill	50	150	24,740
Total					21,014,522

[1] Completed. [2] Under construction.

NOTES.

Salt River.—Five feet additional added to height of spillway since June 30, 1913.

Boise project.—Arrowrock Dam under construction. June 30, 1914, 63 per cent completed.

Minidoka.—Jackson Lake Dam is being raised 17 feet to provide additional storage of about 400,000 acre-feet; twenty 6½ x 8 foot C. I. sluice gates, and twenty 6½ x 8 foot radial gates.

Flathead.—Ninepipe, complete for 5,000 acre-feet. Pablo, complete for 5,000 acre-feet when paved, and paved for 2,000 acre-feet.

Sun River.—Willow Creek Dam completed at present to height of 70 feet with volume of 210,985 cubic yards. May be built to height of 110 feet with volume of 452,000 cubic yards at some future time.

Truckee-Carson.—Lahontan Dam under construction, 80 per cent complete on June 30, 1914.

Rio Grande.—Elephant Butte Dam 63.4 per cent completed June 30, 1914.

DIVERSION DAMS.

Projects.	Name.	Type.	Maximum height.	Length, weir.	Volume.
			Feet.	*Feet.*	*Sq. yds.*
Arizona:					
Salt River	Granite Reef [1]	Rubble concrete weir	38	1,000	40,000
Do	Power Canal [1]	....do	12¾	400	4,800
Do	Joint Head [1]	Concrete weir	10	600	1,740
Arizona-California: Yuma	Laguna [1]	Indian weir, concrete and rock fill.	40	4,780	441,732
California:			20		
Orland	Miller Buttes [1]	Concrete on sheet piling	8	900	550
Do	North Side [1]	Concrete weir, with removable timber crest.	39	360	270
Do	East Park Feed canal. [2]	Concrete arch		158	1,000
Colorado:					
Grand Valley	Diversion [2]	Masonry ogee weir with roller crest 10 to 15 feet high.	24	546	16,500
		Crib and rock fill	11½	237	
Uncompahgre Valley	Gunnison [1]	6 pile and timber weirs	.....	.....	3,200
Do	Uncompahgre [1]				.....
Idaho:					
Boise	Boise River [1]	Rubble concrete weir	45	246	
Minidoka	Minidoka [1]	Combined diversion and storage dam. (See Storage.)	.....	.....	21,750
					.....
Montana: Blackfeet	Two Medicine	Brush and rock	4	165	175
Do	Blacktail [2]	Concrete	14	54	290
Do	Badger, Birch, and Cut Bank.	Badger, Birch, and Cut Bank dams not designed.	.....	.....	.....
Flathead	Jocko River	Not designed	.....	.....	.....
Do	Little Bitter Root River.	....do	.....	.....	.....
Do	Mud Creek [1]	Concrete	12	18	116
Do	Crow Creek [1]	....do	13	82	330
Do	Post Creek [1]	Log crib, rock filled	7	110	1,500
Do	Mission Creek	Log apron	3	80	.....
Do	Post Creek-Pablo	Log crib, rock filled	.....	.....	.....
Do	Dry Creek	Not designed	.....	.....	.....
Do	Finley Creek	....do	.....	.....	.....
Do	Agency Creek	....do	.....	.....	.....
Do	Big Knife Creek [1]	Concrete	5	6	25
Do	Valley Creek and others.	Not designed	.....	.....	.....
Fort Peck	Little Porcupine	Concrete weir on timber crib	4	150	.....
Do	Poplar River	....do	4	300	.....
Do	Big Porcupine	....do	6	150	.....
Milk River	Swift Current	Earth and timber crib	13	2,800	.....
Do	Chinook	Timber crib, rock filled	20	250	3,400
Do	Dodson [3]	....do	25	319	12,000
Do	Vandalia [3]	Reinforced concrete	34	320	11,000
Sun River	Sun River [3]	Concrete masonry	132	220	6,200
Do	Deep Creek	Reinforced-concrete weir	12	100	500
Montana-North Dakota: Lower Yellowstone.	LowerYellowstone [1]	Rock-filled, timber weir	12	700	14,500
Nebraska-Wyoming: North Platte.	Whalan [1]	Concrete weir	29	300	80,740
Nevada:					
Truckee-Carson	Truckee River [1]	16 Concrete sluiceways	22	171	3,322
Do	Carson River [1]	23 Concrete sluiceways	21	240	2,707
Do	.....	Others not designed	.....	.....	.....
New Mexico:					
Carlsbad	Avalon [1]	Combined storage and diversion dam. (See Storage.)	.....	.....	.....
Hondo	Hondo River [1]	Earth fill	20	100	3,700
New Mexico-Texas: Rio Grande.	Leasburg [1]	Rubble concrete weir	9	600	.....
	Mexican [4]	Rubble masonry weir	4.7	3 20	.....
Oklahoma: Lawton	Medicine Bluff	Concrete weir	15	350	400
Oregon:					
Umatilla	Echo [1]	Concrete weir	2½	400	296
Do	Three-Mile Falls [2]	Concrete, multiple arch	24	935	2,600
Oregon-California: Klamath.	Lost River [1]	Hollow reinforced concrete	40	290	5,550
South Dakota: Belle Fourche.	Diversion [1]	Concrete weir	23	400	12,149
Utah: Strawberry Valley	Spanish Fork [1]	Reinforced-concrete weir	16	70	1,261
Washington:					
Okanogan	Salmon Creek [1]	Concrete weir	4½	50	132
Yakima	Sunnyside [1]	Concrete ogee weir	8½	500	2,291
Do	Tieton [1]	Concrete and rock-fill crib	3	110	334
Wyoming: Shoshone	Corbett [1]	Reinforced-concrete weir	18	400	4,951
Total					702,011

[1] Completed.
[2] Under construction.
[3] Completed, present development.
[4] Completed by Mexican authorities and used jointly.

CANALS.

Projects.	Principal canal.			Mileage, with capacity in second-feet.				
	Name.	Maximum capacity.	Length.	Over 800.	301–800	50–300.	Less than 50.	Total.
		Sec.-ft.						
Arizona: Salt River	Power [1]	225	19					
Do	Arizona [1]	2,000	22	32	70	90	549	741
Do	South [1]	1,200	2					
Do	Main Consolidated	1,000	7½					
Arizona-Cal.: Yuma	Main [1]	1,700	12	17	17	110	260	404
California: Orland	East Park Feed [2]	250	6½			6½		6½
Do	South Side [3]	225	20			20	67	87
Do	North Side [3]	80	6			6	41	47
Colorado: Grand Valley	Main	1,425	36½	5	38	21	175	239
Uncompahgre	South [1]	1,300	11½					
Do	Montrose & Delta	450	31½	12	28	100	200	340
Do	Loutsenhizer	290	26					
Idaho: Boise	Main [1]	2,500	34	40	57	165	788	1,050
Minidoka	North Side [1]	1,450	8	12	32	106	563	713
Do	South Side [1]	950	13					
Kansas: Garden City	Main [1]	115	4			2	2	4
Montana: Blackfeet	do	350	25		40	144	600	784
Flathead	St. Mary Feeder	300	11					
Do	Pablo Feeder	300	44					
Do	Kickinghorse Feeder [1]	400	4					
Do	Ninepipe Feeder	250	2		14	82	800	896
Do	Pablo Lateral A	400	17					
Do	Camas A	300	20					
Fort Peck	Diversion	250	1			1	13	14
Do	B and C canals	100	29			29	70	99
Do	Big Porcupine	100	7			7	25	32
Do	Missouri Gravity	625	100		10	30	60	100
Huntley [4]	Main	500	32		10	19	274	303
Milk River	St. Mary	850	26	29				29
Do	Dodson South	900	44	44		156	260	460
Do	Dodson North	200	29			41	60	101
Do	Vandalia South	300	48			45	50	95
Do	Nelson North	250	45			40	30	70
Do	Nelson South	350	30		7	27	50	84
Do	Chinook	550	56		30	45	10	85
Sun River	Fort Shaw	175	12			18	103	121
Do	Pishkun Reservoir supply.	2,500	12	12				12
Do	Sun River Slope	1,000	34	34	10	74	286	404
Do	Other units				8	54	210	272
Montana-North Dakota: Lower Yellowstone.	Main [1]	830	66		49	19	190	258
Neb.-Wyo.: North Platte.	Interstate [1]	1,400	95	90	18½	89	586	783½
Nevada: Truckee-Carson	Truckee [1]	1,500	31	42	62	80	511	695
New Mexico: Carlsbad	Main [1]	450	[5]3		13	12	120	145
Hondo	Main inlet [1]	2,900	2		3	2	45	50
New Mexico-Texas: Rio Grande	Leasburg	485	11		11			11
Do	Franklin	450	30		13	17		30
North Dakota: North Dakota Pumping.	Buford-Trenton	60	6			6	39	45
Do	Williston	90	3			3	57	60
Oklahoma: Lawton	Main	60	8			10		10
Oregon: Umatilla	Feed [1]	300	25		30	55	90	175
Do	West Extension	375	30					
Oreg.-Cal.: Klamath	Main [1]	1,400	9	9	9	42	250	310
Do	Keno [1]	635	1					
South Dakota: Belle Fourche.	Inlet [1]	1,600	6½	7	55	105	460	627
Utah: Strawberry Valley.	Power [1]	500	3		5	40	100	145
Washington: Okanogan	Main [1]	110	2			10	51	61
Yakima	Sunnyside [1]	1,075	57	31	19	33	451	534
Do	Tieton [1]	300	12		12	32	194	238
Wyoming: Shoshone	Garland [1]	1,000	18	11	44	100	710	865
Total				427	714.5	2,093.5	9,400	12,635

[1] Completed. [2] Under construction.
[3] Fifty-seven miles on South Side and 42 miles on North Side completed.
[4] Includes 78 miles of waste-water ditches.
[5] Main and Southern canals 31 miles.

TUNNELS.

Project.	Name.	Length.
		Feet.
Arizona: Salt River. (All Salt River tunnels built.)	Power Canal:[1]	
	Intake	1,695
	Lee	122
	Wehricut-off—	
	No. 1	428
	No. 2	129
	No. 3	271
	Wehri	151
	Pinto	999
	Chilton	1,027
	Robinson	152
	Gray	761
	Moffet	214
	Grapevine	872
	No. 6	206
	No. 7	342
	No. 8	553
	No. 9	320
	No. 10	489
	No. 11	625
	No. 12	70
	No. 13	110
	Roosevelt:[1]	
	Sluicing	480
	Outlet	167
	Penstock	620
Arizona-California: Yuma.	Colorado River siphon.[1]	930
Colorado:		
Grand Valley	Main Canal:	
	No. 1[1]	3,723
	No. 2[2]	1,655
	No. 3[2]	7,292
Uncompahgre	Gunnison[1]	39,645
	South Canal:[1]	
	No. 1	482
	No. 2	395
	No. 3	1,000
	No. 4	400
	No. 5	390
	West Canal[1]	1,750
	West Canal Exten.[1]	800
	Selig Extension:[1]	
	No. 1	160
	No. 2	360
	No. 3	100
	No. 4	310
Idaho: Boise	Arrowrock[1]	487
Montana:		
Flathead	Newell[3]	1,800
	St. Marys Lake Outlet.	1,620
	Pablo 31A[1]	441
Huntley	Main Canal:	
	No. 1[1]	724
	No. 2[1]	1,545
	No. 3[1]	385
Sun River	Willow Creek[1]	584
	Sun River Storage.	200
	Pishkun Canal:	
	No. 1	690
	No. 2[2]	980
	No. 3[2]	2,235
	Muddy Creek Reservoir.	700

TUNNELS—Continued.

Project.	Name.	Length.
		Feet.
Nebraska-Wyoming: North Platte.	Pathfinder:[1]	
	North[1]	480
	South[1]	360
	Drainage[1]	155
	Auxiliary[1]	209
	Crosscut[1]	55
Nevada: Truckee-Carson.	Main Canal:[1]	
	No. 1[1]	901
	No. 2[1]	309
	No. 3[1]	1,515
	Gilpin Spillway[1]	115
New Mexico: Carlsbad.	Spillway:	
	No. 1[1]	97
	No. 2[1]	103
Oregon: Umatilla	Spillway from Feed Canal.[1]	34
Oregon-California: Klamath.	Main Canal[1]	3,300
South Dakota: Belle Fourche.	South Canal[1]	1,306
Utah: Strawberry Valley.	Strawberry[1]	19,897
	Strawberry Dam[1]	532
	Power Canal:	
	No. 1[1]	800
	No. 2[1]	705
	Aqueduct[1]	750
	Highline Canal[2]	230
Washington:		
Okanogan	Conconully outlet[1]	395
Yakima, Tieton.	Steeple, No. 1[1]	55
	Steeple, No. 2[1]	48
	Trail Creek[1]	3,120
	Columnar[1]	1,200
	Tieton[1]	2,729
	North Fork[1]	3,811
Wyoming: Shoshone.[4]	Dam:[1]	
	Lower outlet	498
	Spillway	405
	Upper outlet	315
	Corbett[1]	17,355
	Ralston Reservoir[1]	245
	Shoshone Road:[1]	
	No. 1	39
	No. 2	45
	No. 3	14
	No. 4	28
	No. 5	136
	No. 6	166
	Highline Canal:	
	No. 1	4,497
	No. 2	247
	No. 3	2,100
	No. 4	835
	No. 5	265
	No. 6	2,025
	No. 7	290
	No. 8	283
	No. 9	120
	No. 10	185
	Willwood:	
	No. 1	560
	No. 2	375
Total		147,825

[1] Completed.
[2] Under construction.
[3] 1,703 feet driven.
[4] Ralston Reservoir tunnel is a sluicing tunnel for the settling basin of Corbett tunnel.

POWER DEVELOPMENT.[1]

(Water power unless otherwise specified.)

Project.	Name of plant.	Maximum head (feet).	Brief description as built.	Horsepower.	
				Prime movers installed.	Total proposed or possible.[2]
Arizona: Salt River	Roosevelt	226	Three 1,680-horsepower and two 1,800-horsepower; five 1,060-kilowatt generators	8,640	15,640
Do	South Consolidated	30	Two 1,400-horsepower turbines, direct connected; two 1,000-kilowatt generators	2,800	2,800
Do	Arizona Falls	18	Two 725-horsepower turbines, direct connected; two 525-kilowatt generators	1,450	1,450
Do	Cross-cut	117	Six 1,000-horsepower vertical tangential wheels; six 875-kilowatt generators	6,000	6,000
Arizona-California: Yuma	Drop in California Canal	9			1,000
Do	Araz	25			7,700
California: Orland		27			483
Colorado: Grand Valley	Main Canal	44			3,600
Uncompahgre					10,000
Idaho: Boise	Boise Dam	30	Three 850-horsepower turbines, direct connected; three 625-kilowatt generators	2,550	2,550
Do	Arrowrock Dam	230			17,000
Do	Drops in canals	20–90			4,800
Minidoka	Minidoka Dam	50	Five 2,000-horsepower turbines, direct connected to five 1,400-kilowatt generators	10,000	20,000
Kansas: Garden City	Deerfield (steam)		Two 350-horsepower steam turbines and two 225-kilowatt generators	700	700
Montana: Flathead	Flathead River	60			360,000
Do	Revais Creek	1,000			26,000
Huntley	Main Canal drop	34	Two vertical turbines, direct connected to two 20-inch centrifugal pumps; capacity, 28 second-feet.	286	600
Montana-North Dakota: Lower Yellowstone.	Lateral K K drop				290
Nevada: Truckee-Carson	Lahontan	120	Two 900-horsepower turbines, direct connected to two 625-kilowatt generators	1,800	6,000
Do	26-foot drop	26			2,000
New Mexico-Texas:					
Rio Grande	Elephant Butte (steam)		Three 625-kilowatt steam turbine units	2,000	2,000
Do	Elephant Butte (hydroelectric).				10,000
North Dakota: North Dakota Pumping.	Williston (steam)		Two 300-kilowatt and one 500-kilowatt steam turbine units	1,550	1,550
Oregon: Klamath	Various sites	22–88			9,700
Umatilla	Drainage outfall	28			145
Utah: Strawberry Valley	Spanish Fork	125	Two horizontal 800-horsepower turbines and two 500-kilowatt generators	1,600	3,500
Washington:					
Yakima—					
Sunnyside unit	Drops in canals	20–88			1,800
Tieton unit					3,250
Wapato					9,000
Okanogan	Drop No. 1	105	One 250-horsepower turbine; one 187 kilowatt generator		250
Do	Drop No. 2	56	One 300-horsepower turbine; one 187-kilowatt generator		300
Do	Salmon Creek	441			2,800
			Total	39,376	532,908

[1] Power may be developed on other projects, but data not completed.

[2] Turbine capacity.

IRRIGABLE AREA.

Projects.	Units.		
	Name.	Area.	Total.
		Acres.	*Acres.*
Arizona: Salt River	Gravity system	173,000	182,000
	Pumping system	9,000	
Arizona-California: Yuma	All units	158,000	158,000
California: Orland	do	20,000	20,000
Colorado: Grand Valley	do	53,000	53,000
Colorado: Uncompahgre	do	140,000	140,000
Idaho:			
Boise	do	207,000	207,000
Minidoka	Gravity system	71,000	120,500
	Pumping system	49,500	
Kansas: Garden City	All units	10,677	10,677
Montana:			
Blackfeet	Two Medicine unit	48,000	122,500
	Badger	33,000	
	Cut Bank and Carlow	38,000	
	Birch	3,500	
Flathead	Jocko division	16,000	152,000
	Mission division	23,000	
	Post	30,000	
	Crow	14,000	
	Pablo	40,000	
	Polson	6,000	
	Big Arm	3,000	
	Camas	20,000	
Fort Peck	Little Porcupine	2,000	152,000
	Poplar River	28,000	
	Big Porcupine	4,000	
	Big Muddy	16,000	
	Missouri River	84,000	
	Galpin Bottom pump	10,000	
	Milk River	8,000	
Huntley	All units	32,408	32,408
Milk River	Malta division	12,800	219,557
	Other divisions	206,757	
Sun River	Fort Shaw unit	16,346	174,046
	Great Falls unit	15,700	
	Sun River slope, Spring Valley	15,000	
	Sun River slope, Greenfields Bench	75,000	
	Greenfields Lake	15,000	
	Benton Lake	21,000	
	Muddy Creek Canal	16,000	
Montana-North Dakota: Lower Yellowstone.	First unit	44,797	60,116
	Extensions	15,319	
Nebraska-Wyoming: North Platte	North Platte C. & C. Co	17,837	129,270
	First lateral district	36,760	
	Second lateral district	34,100	
	Third lateral district	38,000	
	Miscellaneous tracts	2,573	
Nevada: Truckee-Carson	First unit	96,573	206,000
	Other units	109,427	
New Mexico:			
Carlsbad	All units	20,261	20,261
Hondo	do	10,000	10,000
New Mexico-Texas: Rio Grande	Palomas and Rincon Valleys	27,000	155,000
	Mesilla Valley	83,000	
	El Paso Valley	45,000	
North Dakota: North Dakota pumping	Buford-Trenton unit:		15,025
	First division	4,050	
	Extensions	1,375	
	Upper Bottom division	2,600	
	Lower Bottom division	4,000	
	Trenton Flat	3,000	
	Williston unit:		11,289
	First division	8,189	
	West Bottom division	1,900	
	East Bottom division	1,200	
Oklahoma: Lawton	Lawton unit	2,500	2,500
Oregon: Umatilla	Hermiston unit	6,968	36,300
	Second unit	4,350	
	Third unit	3,957	
	Fourth unit	1,976	
	Umatilla unit	1,150	
	Other units, and West extension	17,899	
Oregon-California: Klamath	First unit	29,600	70,600
	Second unit	6,000	
	Tule Lake unit	35,000	

IRRIGABLE AREA.

Projects.	Present status.						
	Public land.			State land.	Indian land.	Private land.	Total.
	Entered.	Open.	Withdrawn				
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Salt River	14,000				2,000	166,000	182,000
Yuma	6,200		67,000		8,800	76,000	158,000
Orland			4			19,996	20,000
Grand Valley	13,250		16,820			22,930	53,000
Uncompahgre Valley	15,000		19,000			106,000	140,000
Boise	62,003		6,238	15,721		123,038	207,000
Minidoka	97,571	929		19,900		2,100	120,500
Garden City						10,677	10,677
Blackfeet	11,000		53,000		58,500		122,500
Flathead	49,000	1,000		5,000	97,000		152,000
Fort Peck	9,713		107	180	142,000		152,000
Huntley	24,021	1,595	3,600			3,192	32,408
Milk River	43,700		28,300	8,700	30,000	108,857	219,557
Sun River	46,139	3,041	52,025	11,819		61,022	174,046
Lower Yellowstone	15,919	1,962		1,647		40,588	60,116
North Platte	77,815	5,543	371	11,048		34,493	129,270
Truckee-Carson	21,322	265	118,864	102		65,447	206,000
Carlsbad						20,261	20,261
Hondo	240					9,760	10,000
Rio Grande	1,423		5,000			148,577	155,000
Buford-Trenton	288	251	1,640	411		12,435	15,025
Williston unit	54	289		67		10,879	11,289
Lawton					600	1,900	2,500
Umatilla	2,752	116	5,156			28,276	36,300
Klamath	44	23	31,933			38,600	70,600

IRRIGABLE AREA—Continued..

Projects.	Units.		
	Name.	Area.	Total.
		Acres.	*Acres.*
South Dakota: Belle Fourche	All units	100,000	100,000
Utah: Strawberry Valley	Mapleton	3,500	50,000
	Lake Shore	2,500	
	Highline	24,000	
	Old canals	20,000	
Washington:			
Okanogan	First unit	2,018	10,099
	Second unit	6,085	
	Third unit	464	
	Old water rights	1,381	
	Town of Okanogan	151	
Yakima—Sunnyside unit	Konnewock lands	3,080	102,824
	Main project	72,875	
	Mabton division	9,000	
	Prosser division	1,169	
	Pumping lands	16,700	
Yakima—Tieton unit	Naches Ridge division 1	10,799	34,071
	Cowiche-Yakima division 2	7,941	
	Wide Hollow, division 3	15,331	
Wyoming: Shoshone	First unit	15,246	164,122
	Second unit	15,819	
	Third unit	3,728	
	Fourth unit	6,375	
	Subsequent units	122,954	
Total, all projects		2,921,165	2,921,165
Per cent		100	100

NOTES.

Salt River.—The area may be increased ultimately by the Water Users' Association by 37,000 acres through the construction of the Horseshoe Reservoir and additional pumping plants.
Boise.—Area is exclusive of 36,000 acres which may be included in project at future time.
Minidoka.—63,295 acres entered subject to reclamation act.
Sun River.—10,211 acres entered subject to reclamation act.
Lower Yellowstone.—8,902 acres entered subject to reclamation act.
North Platte.—61,055 acres entered subject to reclamation act.
Belle Fourche.—21,282 acres entered subject to reclamation act.

IRRIGABLE AREA—Continued.

Projects.	Present status.						
	Public land.			State land.	Indian land.	Private land.	Total.
	Entered.	Open.	Withdrawn.				
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Belle Fourche	24,827	3,804	16,000	5,500	.....	49,869	100,000
Strawberry Valley	.....	.....	3,500	.....	.....	46,500	50,000
Okanogan	1,234	.....	.....	.....	.....	8,865	10,099
Sunnyside unit	1,500	.....	925	2,660	.....	97,739	102,824
Tieton unit	1,852	324	.....	2,274	.....	29,621	34,071
Shoshone	25,260	12,955	117,254	6,430	.....	2,223	164,122
Total	566,127	32,097	546,737	91,459	338,900	1,345,845	2,921,165
Per cent	19.4	1.2	18.7	3.1	11.6	46.1	100

SUMMARY OF RESULTS.

Summary of reclamation work to June 30, 1914.

Projects.	Irrigable lands.									
	Estimated on completion.		Service could have supplied in 1914.		Season of 1914.					
					Under water rights.		Under rental contracts.		Total under contract.	
	Acres.	Farms.	Acres.	Farms.	Acres.	Farms.	Acres.	Farms.	Acres.	Farms.
Arizona:										
Salt River	[1] 182,000	3,750	[1] 182,000	3,750	.....	.....	182,000	3,750	182,000	3,750
Water users	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Side	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Indian project, Gila River	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona-California: Yuma	158,000	4,000	58,000	1,450	6,500	174	23,550	476	30,050	650
California: Orland	20,000	507	14,307	370	.....	.....	8,000	275	8,000	275
Colorado:										
Grand Valley	53,000	900	.....	.....	.....	.....	.....	.....	.....	.....
Uncompahgre Valley	140,000	3,500	58,000	1,470	.....	.....	70,000	1,220	70,000	1,220
Idaho:										
Boise—										
Distribution	[2] 207,000	2,699	[2] 207,000	2,600	.....	.....	84,360	1,771	84,360	1,771
Storage unit	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Minidoka	120,500	2,285	116,400	2,113	65,200	1,184	39,005	626	104,205	1,810
Snake River storage	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kansas: Garden City	10,677	284	.....	.....	.....	.....	.....	.....	.....	.....
Montana:										
Blackfeet	122,500	3,060	26,649	661	760	12	.....	.....	760	12
Flathead	152,000	2,980	48,400	800	.....	.....	13,996	212	13,996	212
Fort Peck	152,000	2,790	10,220	255	1,200	30	.....	.....	1,200	30
Huntley	32,408	697	28,808	627	24,757	554	.....	.....	24,757	554
Milk River	219,557	3,720	14,000	230	.....	.....	2,166	30	2,166	30
St. Mary storage	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sun River	174,046	2,900	16,346	262	10,611	192	194	3	10,805	195
Montana-North Dakota:										
Lower Yellowstone	60,116	723	40,541	512	6,542	79	27,737	329	34,279	408
Nebraska-Wyoming: North Platte	129,270	1,270	109,500	1,130	77,097	981	18,088	129	95,185	1,110
Nevada: Truckee-Carson	206,000	2,575	52,039	527	30,855	417	12,963	113	43,823	530
New Mexico:										
Carlsbad	20,261	525	20,261	525	20,211	524	50	1	20,261	525
Hondo	10,000	150	.....	.....	.....	.....	2,705	25	2,705	25
Rio Grande	155,000	5,000	40,000	1,200	.....	.....	28,000	900	28,000	900
Elephant Butte storage	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Dakota:										
North Dakota pumping—										
Buford Trenton	15,025	250	4,050	41	1,998	26	.....	.....	1,998	26
Williston	11,289	186	8,189	134	173	4	1,866	35	2,039	39
Oklahoma: Lawton	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oregon: Umatilla	36,300	1,070	17,587	540	13,496	438	590	9	14,086	447
Oregon-California: Klamath	70,600	1,180	35,400	490	26,488	350	2,057	19	28,545	369
South Dakota: Belle Fourche	100,000	1,400	68,852	980	49,130	639	360	18	49,490	657
Utah: Strawberry Valley	50,000	1,250	.....	.....	.....	.....	.....	.....	.....	.....
Washington:										
Okanogan	10,099	550	10,099	550	8,157	475	1,592	75	9,749	550
Yakima storage	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sunnyside unit	102,824	4,240	81,306	3,780	24,024	1,026	47,402	2,395	71,426	3,421
Tieton	34,071	1,481	34,071	1,481	23,674	1,030	.....	.....	23,674	1,030
Wyoming: Shoshone	164,122	2,500	41,168	637	25,771	424	157	5	25,928	429
Total, June, 1914	2,921,165	58,323	1,343,193	27,115	416,644	8,559	566,843	12,416	983,487	20,975
Total, June, 1913	2,973,048	60,569	1,290,107	26,674	431,457	8,786	510,815	12,168	942,272	20,954
Increase	−51,883	−2,246	53,086	441	−14,813	−227	60,028	248	41,215	21

[1] The area may be increased ultimately by the water users' association by 37,000 acres through the construction of the Horseshoe Reservoir and additional pumping plants; 5,000 acres additional under water-rental contracts; total 187,000 acres.

[2] Exclusive of 36,000 acres that may possibly be included.

Summary of reclamation work to June 30, 1914—Continued.

Projects.	Available reservoir capacity (acre-feet).	Canals and ditches (miles).						Tunnels.		Storage and diversion dams.			
		Canal (capacities, second-feet).				Waste-water ditches.	Total miles.	Number.	Length (feet).	Masonry.	Earth.	Rock fill and crib.	Total.
		Over 800.	301 to 800.	50 to 300.	Less than 50.								
										Cubic yards.	*Cubic yards.*	*Cubic yards.*	*Cubic yards.*
Arizona:													
Salt River	1,367,300	32	64	72	482	14	664	23	10,802	388,865	.....	390	389,255
Water users	.....	...	6	.....	.....	...	6	...	.....	.....	.....	.....	.....
South side	.....	...	...	17	49	...	66	...	.....	.....	.....	.....	.....
Indian project, Gila River	.....	...	...	11	9	1	21	...	.....	.....	.....	.....	.....
Arizona - California: Yuma	.....	17	13	62	165	11	268	1	930	66,714	.....	375,018	41,732
California: Orland	45,600	...	...	24	75	...	99	...	.....	12,697	.....	.....	12,697
Colorado:													
Grand Valley	.....	4	...	.....	.....	...	4	3	9,572	3,955	.....	.....	3,955
Uncompahgre Valley	.....	12	19	71	144	9	255	12	36,792	1,500	.....	1,700	3,200
Idaho:													
Boise—													
Distribution	177,640	40	57	165	709	79	1,050	...	.....	21,749	2,400,380	.....	2,422,129
Storage unit	.....	...	...	.....	.....	...	.....	1	487	362,000	.....	.....	362,000
Minidoka	53,500	12	32	106	443	120	713	...	.....	16,564	146,677	79,321	242,562
Snake River storage	380,000	...	...	.....	.....	...	.....	...	.....	3,649	63,345	4,037	71,031
Kansas: Garden City	.....	...	...	2	2	...	4	...	.....	.....	.....	.....	.....
Montana:													
Blackfeet	16,000	...	...	85	170	...	255	...	.....	2,370	25,750	.....	28,120
Flathead	10,000	...	11	72	248	...	331	2	2,062	.....	337,271	2,238	339,509
Fort Peck	3,900	...	...	36	65	...	101	...	.....	475	34,000	450	34,925
Huntley	.....	...	10	19	196	78	303	3	2,654	.....	.....	.....	.....
Milk River	.....	8	35	79	79	56	257	...	.....	4,653	5,900	16,713	27,266
St. Mary storage	.....	10	...	.....	.....	...	10	...	.....	.....	.....	.....	.....
Sun River	16,700	...	5	18	103	12	138	4	3,812	1,082	191,756	9,709	202,547
Montana - North Dakota: Lower Yellowstone	.....	...	49	19	144	35	247	...	.....	.....	.....	14,500	14,500
Nebraska - Wyoming: North Platte	1,081,400	90	19	81	564	12	766	5	1,259	66,410	950,775	.....	1,017,185
Nevada: Truckee-Carson	200,000	42	62	80	511	5	700	4	2,840	68,544	543,944	.....	612,488
New Mexico:													
Carlsbad	77,000	...	13	12	120	5	150	2	200	6,251	221,081	105,477	332,809
Hondo	40,000	...	3	2	45	...	50	...	.....	.....	616,282	27,410	643,692
Rio Grande	.....	...	21	17	.....	...	38	...	.....	2,318	1,878	.....	4,196
Elephant Butte storage	.....	...	...	.....	.....	...	.....	...	.....	234,000	.....	.....	234,000
North Dakota:													
North Dakota pumping—													
Buford-Trenton	.....	...	...	1	14	...	15	...	.....	.....	.....	.....	.....
Williston	.....	...	...	3	43	15	61	...	.....	.....	.....	.....	.....
Oregon: Umatilla	50,000	...	25	27	60	10	122	1	34	4,380	764,000	33,890	802,270
Oregon - California: Klamath	662,000	9	1	42	131	30	213	1	3,300	5,600	36,200	33,500	75,300
South Dakota: Belle Fourche	203,770	7	43	90	374	12	526	1	1,306	38,309	1,550,800	.....	1,589,109
Utah: Strawberry Valley	278,000	...	5	4	.....	...	9	5	22,684	1,261	132,120	.....	133,381
Washington:													
Okanogan	15,600	...	...	10	50	1	61	1	395	131	336,630	130	336,891
Yakima storage	310,000	...	...	.....	.....	...	.....	...	.....	.....	451,177	.....	451,177
Sunnyside unit	.....	31	19	33	442	9	534	...	.....	2,291	.....	.....	2,291
Tieton	.....	...	12	32	193	1	238	6	10,963	609	2,070	301	2,980
Wyoming: Shoshone	472,100	11	14	26	196	33	280	11	19,249	80,527	5,200	.....	85,727
Total, June, 1914	5,460,510	325	538	1,318	5,826	548	8,555	86	129,341	1,346,904	8,817,236	704,784	10,868,924
Total, June, 1913	5,051,210	313	471	1,206	5,538	433	7,961	77	117,760	868,176	7,955,067	700,409	9,523,652
Increase	409,300	12	67	112	288	15	594	9	11,581	478,728	862,169	4,375	1,345,272

Summary of reclamation work to June 30, 1914—Continued.

Project.	Dikes or levees.		Canal structures.								
			Over $2,000.		$500 to $2,000.		$100 to $500.		Less than $100.		
	Length (feet).	Volume (cubic yards).	Concrete.	Wood.	Concrete.	Wood.	Concrete.	Wood.	Concrete.	Wood.	Total.
Arizona:											
Salt River	5,716	63,804	32		229		246	424	34	242	1,207
Water users			6		3		6				15
South Side					1		38		1	207	247
Indian project: Gila River	5,000	9,362	5		5		40				50
Arizona-California: Yuma	276,280	2,818,154	24	1	26	14	176	271	261	654	1,427
California: Orland	825	4,500	4		11	1	55	7	1,167	15	1,260
Colorado:											
Grand Valley			5		3	2		1			11
Uncompahgre Valley	2,935	10,825	27	21	22	47	31	66	5	1,111	1,330
Idaho:											
Boise—											
Distribution	1,075	3,761	68		86	33	2,035	1,840	1,021	6,213	11,296
Storage unit											
Minidoka	3,100	3,472	26	2	61	9	819	210	26	5,455	6,608
Snake River storage											
Kansas: Garden City			1							3	4
Montana:											
Blackfeet			7	1	5	7	25	9	83	1,076	1,213
Flathead			22	2	23	5	100	77	117	1,082	1,428
Fort Peck			9		6		37	1	24	175	252
Huntley			26	3	28	4	88	92	148	2,052	2,441
Milk River	36,750	166,122	20	7	24	6	17	40		503	617
St. Mary storage											
Sun River	3,192	4,600	7		7		38	16	135	483	686
Montana-North Dakota: Lower Yellowstone	35,600	138,276	59	1	109	2	45	69	79	1,287	1,651
Nebraska-Wyoming: North Platte	1,650	131,110	32	14	137	24	990	20	698	3,961	5,876
Nevada: Truckee-Carson	57,300	85,672			172	5	140	300	25	1,029	1,741
New Mexico:											
Carlsbad	7,100	155,676	7		6		34		372		419
Hondo					10		77			11	98
Rio Grande	1,700	16,815	11		29		18	29	1	109	197
Elephant Butte storage	1,900	4,200									
North Dakota:											
North Dakota pumping—											
Buford-Trenton			2		1		8			80	91
Williston			8		11		22		3	445	489
Oregon: Umatilla	1,400	8,000	14		8		35		449	255	761
Oregon-California: Klamath	5,700	40,300	8	5	11	22	46	30	2	825	949
South Dakota: Belle Fourche			28		101	19	212	181	24	2,191	2,756
Utah: Strawberry Valley	1,811	102,517	10		1						11
Washington:											
Okanogan			1		2		2	6	8	1,070	1,089
Yakima storage											
Sunnyside unit	1,600	18,000	56	1	13		185	4	70	5,980	6,309
Tieton	350	584	19	16	79	6	327	43		43	533
Wyoming: Shoshone	435	5,200	31	1	34		86	12	869	530	1,563
Total, June, 1914	451,419	3,790,950	645	75	1,264	206	5,978	3,748	5,622	37,087	54,625
Total, June, 1913	433,684	3,697,228	576	51	1,152	178	5,715	3,495	5,044	34,022	50,233
Increase	17,735	93,722	69	24	112	28	263	253	578	3,065	4,392

Summary of reclamation work to June 30, 1914—Continued.

Project.	Bridges—Number and length.													
	Steel.			Combination.			Wood.			Concrete.			Total.	
	Over 50.	Less 50.	Length.	Over 50.	Less 50.	Length.	Over 50.	Less 50.	Length.	Less 50.	Over 50.	Length.	Number.	Length.
Arizona:														
Salt River	2	1	186	11	27	1,622	3	150	2,129	4	10	672	208	4,609
Water users	....	....	.....	2	1	131	1	.....	67	1	.....	66	5	264
South Side	....	....	.....	....	12	344	....	31	203	....	....	.....	43	547
Indian project, Gila River	....	9	270	....	.....	.....	....	.....	.....	....	1	25	10	295
Arizona - California: Yuma	....	....	.....	3	8	372	7	62	2,052	6	17	714	103	3,138
California: Orland	....	....	.....	....	56	510	....	4	98	....	139	700	199	1,308
Colorado: Grand Valley	....	....	.....	....	.....	.....	2	1	208	....	....	.....	3	208
Uncompahgre Valley	....	....	.....	....	3	63	4	101	2,249	....	....	.....	108	2,312
Idaho:														
Boise—														
Distribution	....	....	.....	....	.....	.....	35	886	13,341	....	....	.....	921	13,341
Storage unit	....	....	.....	....	.....	.....	4	14	1,228	....	....	.....	18	1,228
Minidoka	....	....	.....	....	4	160	60	209	9,252	....	....	.....	273	9,412
Snake River storage	....	....	.....	....	.....	.....	....	.....	.....	....	....	.....	.....	.....
Kansas: Garden City	....	....	.....	....	.....	.....	....	3	60	....	....	.....	3	.....
Montana:														
Blackfeet	....	....	.....	....	.....	.....	1	37	845	....	....	.....	38	845
Flathead	....	....	.....	....	.....	.....	....	145	2,558	....	....	.....	145	2,558
Fort Peck	....	....	.....	....	1	36	....	31	611	....	....	.....	32	647
Huntley	1	1	104	....	.....	.....	....	143	2,048	....	....	.....	145	2,152
Milk River	1	1	115	....	.....	.....	5	59	1,849	....	....	.....	66	1,964
St. Mary storage	1	....	200	....	.....	.....	2	27	602	....	....	.....	30	802
Sun River	....	8	225	1	.....	60	2	29	1,009	....	....	.....	40	1,294
Montana - North Dakota: Lower Yellowstone	15	16	1,474	....	6	141	8	145	2,371	....	....	.....	190	3,986
Nebraska - Wyoming: North Platte	11	....	726	11	.....	726	7	114	3,027	....	....	.....	143	4,479
Nevada: Truckee-Carson	....	....	.....	6	8	692	9	119	3,816	2	.....	360	144	4,868
New Mexico:														
Carlsbad	....	....	.....	....	.....	.....	1	.....	225	....	....	.....	1	225
Hondo	....	....	.....	....	.....	.....	....	11	130	....	....	.....	11	130
Rio Grande	....	....	.....	5	13	804	3	69	2,404	1	9	239	100	3,447
Elephant Butte storage	1	....	300	....	.....	.....	2	.....	816	....	....	.....	3	1,116
North Dakota:														
North Dakota pumping—														
Buford-Trenton	....	....	.....	....	4	68	....	.....	.....	....	....	.....	4	68
Williston	....	....	.....	....	12	225	....	3	31	....	....	.....	15	256
Oregon: Umatilla	1	....	185	....	.....	.....	....	47	996	....	1	31	49	1,212
Oregon-California: Klamath	....	....	.....	....	.....	.....	20	147	5,174	....	....	.....	167	5,174
South Dakota: Belle Fourche	5	....	360	....	.....	.....	3	258	3,181	....	2	28	268	3,569
Utah: Strawberry Valley	....	....	.....	....	.....	.....	....	24	600	2	5	260	31	860
Washington:														
Okanogan	....	....	.....	....	.....	.....	....	3	100	....	....	.....	3	100
Yakima storage	2	....	276	1	.....	140	5	.....	380	....	....	.....	8	796
Sunnyside unit	1	....	500	....	.....	.....	7	28	1,150	....	....	.....	36	1,650
Tieton	....	....	.....	....	.....	.....	8	165	3,548	....	....	.....	173	3,548
Wyoming: Shoshone	4	3	416	....	.....	.....	10	112	2,245	....	10	96	139	2,757
Total, June, 1914	45	39	5,337	40	155	6,094	209	3,177	70,603	16	194	3,191	3,875	85,225
Total, June, 1913	43	38	5,033	32	270	6,910	169	2,596	56,325	12	179	2,632	3,339	70,900
Increase	2	1	304	8	−115	−816	40	581	14,278	4	15	559	536	13,729

Summary of reclamation work to June 30, 1914—Continued.

Projects.	Culverts.									
	Concrete.		Metal.		Terra cotta.		Wood.		Total.	
	Number.	Length.	Number.	Length.	Number.	Length.	Number.	Length.	Number.	Length.
		Feet.		*Feet.*		*Feet.*		*Feet.*		*Feet.*
Arizona:										
Salt River	48	2,675					58	2,000	106	4,675
Water users										
South Side	40	1,214							40	1,214
Indian project, Gila River	15	300							15	300
Arizona-California: Yuma	137	2,644	3	61	3	150	193	3,088	336	5,943
California: Orland	72	2,980							72	2,980
Colorado:										
Grand Valley	2	392	3	520					5	912
Uncompahgre Valley	25	2,901	21	1,186	2	140	18	439	66	4,666
Idaho:										
Boise—										
Distribution							330	4,550	330	4,550
Storage (Arrowrock)							96	2,880	96	2,880
Minidoka	21	2,146	615	15,464			305	8,787	941	26,397
Idaho-Wyoming:										
Snake River storage										
Jackson Lake enlargement										
Kansas: Garden City										
Montana:										
Blackfeet	22	1,962					87	5,629	109	7,591
Flathead	22	1,308	2	78			82	1,480	106	2,866
Fort Peck	5	134					13	218	18	352
Huntley	39	2,055	95	3,214	28	1,440	381	8,471	543	15,180
Milk River	4	155	13	676	27	2,445	9	140	53	3,426
St. Mary storage							85	1,700	85	1,700
Sun River	61	2,290					117	2,215	178	4,505
Montana-North Dakota: Lower Yellowstone	40	3,822			45	3,848	209	4,038	294	11,708
Nebraska-Wyoming: North Platte	41	1,188	97	2,493	77	1,449	49	784	264	5,914
Nevada: Truckee-Carson					4	210	14	196	18	406
New Mexico:										
Carlsbad	1	400							1	400
Hondo										
New Mexico-Texas:										
Rio Grande										
Elephant Butte storage										
North Dakota:										
North Dakota pumping—										
Buford-Trenton unit	6	230					23	398	29	628
Williston unit	25	1,112					78	2,263	103	3,375
Oregon: Umatilla	6	194							6	194
Oregon-California: Klamath	3	410					8	400	11	810
South Dakota: Belle Fourche	32	2,812	20	1,996	101	4,924	12	180	165	9,912
Utah: Strawberry Valley	3	170					25	450	28	620
Washington:										
Okanogan	9	516							9	516
Yakima storage unit										
Sunnyside unit	15	1,870							15	1,870
Tieton unit	62	4,214							62	4,214
Wyoming: Shoshone	364	11,011	11	650	19	1,575	137	4,322	531	17,558
Total, June, 1914	1,120	51,105	880	26,338	306	16,191	2,329	54,628	4,635	148,262
Total, June, 1913	1,130	47,897	672	16,779	196	9,679	1,853	46,080	3,851	120,435
Increase	[1] −10	3,208	208	9,559	110	6,512	476	8,548	784	27,827

[1] Decrease, due to reclassification of culverts.

Summary of reclamation work to June 30, 1914—Continued.

Projects.	Pipe length.					Flumes.							
						Concrete.		Metal.		Wood.		Total.	
	Concrete.	Metal.	Terra cotta.	Wood.	Total.	Number.	Length.	Number.	Length.	Number.	Length.	Number.	Length.
Arizona:	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*		*Feet.*		*Feet.*
Salt River	13,092				13,092	8	240			33	1,540	41	1,780
Water users	4,244				4,244	1	595					1	595
South Side	416	6,060	618		7,094					1	16	1	16
Indian project, Gila River													
Arizona-California: Yuma		61	21,075		21,136	1	30			9	960	10	990
California: Orland	5,870				5,870			2	365			2	365
Colorado:													
Grand Valley		1,240	1,735		2,975								
Uncompahgre Valley	1,509	6,994	4,758		13,261			85	13,872	42	7,210	127	21,082
Idaho:													
Boise—													
Distribution	45,994	586		22,883	69,463			75	42,436	158	5,232	233	47,668
Storage (Arrowrock)		2,000		4,100	6,100								
Minidoka	2,255	1,693		8,864	12,812	2	190	12	708	136	8,282	150	9,180
Idaho-Wyoming: Snake River storage													
Jackson Lake enlargement		3,872			3,872								
Kansas: Garden City													
Montana:													
Blackfeet	4,656	1,346			6,002			3	1,216	3	503	6	1,719
Flathead	4,225	2,235			6,460					41	7,918	41	7,918
Fort Peck	426	308			734			4	608	2	90	6	698
Huntley	2,826	3,214	112,903		118,943	2	168	15	2,640	20	2,285	37	5,095
Milk River	400	676	2,455		3,531			4	327	9	2,122	13	2,449
St. Mary storage		1,434			1,434								
Sun River	1,627	610			2,237			2	330	3	136	5	466
Montana-North Dakota: Lower Yellowstone			20,485		20,485	10	841			30	1,173	40	2,014
Nebraska-Wyoming: North Platte	971	3,645	55,359	1,752	61,727	2	466	23	6,320	2	80	27	6,865
Nevada: Truckee-Carson	634	3,500	12,796	958	17,888			2	300			2	300
New Mexico:													
Carlsbad	1,502		15,096		16,598	1	497	1	40			2	537
Hondo		448			448								
New Mexico-Texas: Rio Grande										1	22	1	22
Elephant Butte storage													
North Dakota:													
North Dakota pumping—													
Buford-Trenton unit	2,762	434			3,196	1	42	1	296			2	338
Williston unit	2,283	326			2,609			4	376	1	133	5	509
Oregon: Umatilla	82,758		8,349	10,500	101,607			21	1,000	4	365	25	1,365
Oregon-California: Klamath	140	3,870	2,440		6,450			6	751	14	11,736	20	12,487
South Dakota: Belle Fourche	7,162	3,436	22,007	4,072	36,677			12	4,880	20	5,640	32	10,520
Utah: Strawberry Valley													
Washington:													
Okanogan		105,000	1,650		106,650					2	475	2	475
Yakima storage unit	1,936				1,936								
Sunnyside unit	6,400		5,000	109,500	120,900			6	3,900	500	200,000	506	203,900
Ticton unit	246,132		3,622	29,407	279,161			16	9,551	121	67,847	137	77,398
Wyoming: Shoshone	14,364	650	161,580		176,594	1	54	3	210	112	4,610	116	4,874
Total, June, 1914	454,584	153,638	451,928	192,036	1,252,186	29	3,123	297	90,126	1,264	328,375	1,590	421,624
Total, June, 1913	433,212	32,287	181,339	184,149	830,987	28	3,039	238	74,712	1,171	323,640	1,437	401,391
Increase	21,372	121,381	270,589	7,887	421,199	1	84	59	15,414	93	4,735	153	20,233

Summary of reclamation work to June 30, 1914—Continued.

Projects.	Canal lined (miles).		Buildings.						Wells.		Roads (miles).	Railroads (miles).	Telephones.		Transmission lines (miles).	Power development.[1]
	Concrete.	Wood.	Offices.	Residences.	Power plants.	Pumping stations.	Barns, etc.	Total.	Number.	Depth.			Lines (miles).	Number.		
										Feet.						
Arizona:																
Salt River	0.5	....	1	17	1	8	10	37	34	8,511	147	....	214	70	118	8,640
Water users	....	....	....	3	2	....	....	5	1	165	5	....	....	....	12	4,250
South Side	....	....	....	....	....	1	....	1	....	....	....	....	....	....	3	.....
Indian project, Gila River	....	....	....	1	1	8	2	12	10	2,054	10	....	23	7	23	.....
Arizona-California: Yuma	....	....	1	5	....	2	5	13	....	....	25	28	144	104	....	.....
California: Orland	3.7	....	1	1	....	....	4	6	3	200	....	....	[2] 50	[2] 9	....	.....
Colorado:																
Grand Valley	.1	....	....	1	....	....	....	1	....	....	....	....	5	2	....	.....
Uncompahgre Valley	5.8	0.1	3	13	2	....	15	33	....	....	22	7	33	25	7	.....
Idaho:																
Boise—																
Distribution	6.5	....	10	10	....	....	23	43	4	760	15	....	167	94	....	.....
Storage (Arrowrock)	....	....	1	33	1	....	28	63	....	....	21	19	47	52	26	2,550
Minidoka	.1	....	3	11	1	10	19	44	15	912	8	....	144	100	69	10,000
Idaho-Wyoming: Snake River storage	....	....	....	1	....	....	2	3	....	....	36	....	70	7	....	.....
Jackson Lake enlargement	....	....	1	2	....	2	7	12	1	25	....	....	....	....	....	.....
Kansas: Garden City	....	....	....	1	1	23	1	26	216	8,800	....	....	5	4	5	[3] 700
Montana:																
Blackfeet	....	....	1	1	....	....	2	4	6	184	7	....	115	11	....	.....
Flathead	.5	....	6	19	....	....	21	46	3	80	13	....	104	19	....	.....
Fort Peck	....	....	3	7	....	....	8	18	3	75	....	....	....	....	....	.....
Huntley	.1	....	1	11	....	1	11	24	4	625	....	....	23	12	....	286
Milk River	.1	....	4	24	....	....	20	48	3	95	6	....	....	[2] 9	....	.....
St. Mary storage	....	....	3	3	....	....	36	71	2	60	75	....	108	15	....	.....
Sun River	....	....	6	4	....	....	29	81	5	275	35	....	123	28	....	.....
Montana-North Dakota: Lower Yellowstone	....	....	4	16	....	....	8	28	7	200	12	....	78	35	....	.....
Nebraska-Wyoming: North Platte	....	....	2	6	....	....	6	14	15	1,516	....	....	[2] 186	[2] 34	....	.....
Nevada: Truckee-Carson	2.5	....	5	15	1	1	6	28	....	....	65	4	128	58	20	1,800
New Mexico:																
Carlsbad	3.9	....	1	5	....	....	10	16	1	127	25	....	....	....	....	.....
Hondo	....	....	....	1	....	....	....	1	1	365	....	....	15	4	....	.....
New Mexico-Texas: Rio Grande	2.1	....	....	2	....	....	2	4	2	28	7	....	2	2	....	.....
Elephant Butte storage	....	....	1	92	1	1	47	142	1	20	19	13	21	40	8	[3] 2,000
North Dakota:																
North Dakota pumping—																
Buford-Trenton unit	....	....	1	3	....	2	2	8	1	30	....	....	29	2	29	.....
Williston unit	....	....	2	6	1	3	5	17	2	100	....	....	4	5	4	[3] 1,550
Oregon: Umatilla	31.0	....	1	6	....	....	6	13	5	348	7	....	....	16	....	.....
Oregon-California: Klamath	.6	1.4	1	6	....	....	12	19	6	690	....	....	86	44	....	.....
South Dakota: Belle Fourche	.4	.2	3	9	....	....	9	21	2	1,968	....	7	75	27	....	.....
Utah: Strawberry Valley	1.5	....	1	5	1	....	2	9	....	....	44	....	44	12	50	1,600
Washington:																
Okanogan	13.8	....	1	5	....	....	4	10	....	....	2	....	25	15	....	.....
Yakima storage unit	....	....	....	4	....	....	....	4	....	....	46	....	63	28	....	.....
Sunnyside unit	3.0	....	1	19	....	....	4	24	1	120	....	....	124	40	....	.....
Tieton unit	9.8	....	2	13	....	....	3	18	....	....	30	....	59	47	....	.....
Wyoming: Shoshone	.4	....	3	31	....	1	16	51	7	384	51	....	62	26	....	.....
Total, June, 1914	86.4	1.7	74	483	13	63	385	1,018	301	28,717	733	78	2,376	1,003	402	33,376
Total, June, 1913	Not kept.		65	426	14	61	332	898	348	26,237	697	51	2,331	927	351	32,466
Increase	....	....	9	57	−1	2	53	120	13	2,480	36	27	45	76	51	910

[1] Horsepower measured at prime mover. Data for Salt River project does not include 6,000 horsepower installed at Cross-cut plant, which was not operated on June 30, 1914.
[2] Leased telephone lines.
[3] Steam plant.

Summary of reclamation work to June 30, 1914—Continued.

Projects.	Material excavated.				Rip-rap.	Paving.	Concrete.	Cement used.	Cement and sand cement manufacturing by United States.
	Class 1, earth.	Class 2, indurated material.	Class 3, rock.	Total.					
	Cubic yards.	*Cubic yards.*	*Cubic yards.*	*Cubic yards.*	*Cubic yards.*	*Square yards.*	*Cubic yards.*	*Barrels.*	*Barrels.*
Arizona:									
Salt River	3,225,030	1,011,972	580,664	4,817,666	7,000	7,711	337,389	414,898	338,452
Water users	314,781	14,300	117,180	446,261	.....	15,284	13,842	17,722	.....
South Side	223,496	18,284	4,468	246,248	.....	1,058	1,702	3,058	.....
Indian project, Gila River	302,285	16,261	9,452	327,998	.....	2,154	1,687	2,109	.....
Arizona-California:									
Yuma	9,429,814	372,567	961,483	10,763,864	275,615	100,163	96,492	104,694	.....
California: Orland	405,591	97,053	6,313	508,957	1,200	2,685	21,845	23,916	.....
Colorado:									
Grand Valley	400,387	26,401	94,037	520,825	40	4,467	15,889	17,453	.....
Uncompahgre Valley	1,545,461	694,956	454,352	2,694,769	4,541	1,318	87,911	82,051	.....
Idaho:									
Boise—									
Distribution	9,580,387	1,195,995	236,891	11,013,273	9,425	12,492	60,765	85,901	.....
Storage (Arrowrock)	711,000	79,000	450,000	1,240,000	6,900	.....	370,000	249,316	[1] 355,180
Minidoka	10,235,466	201,551	416,012	10,853,029	.....	93,069	38,226	42,691	.....
Idaho-Wyoming:									
Snake River storage	183,000	.....	6,749	189,749	4,037	11,364	3,649	3,182	.....
Jackson Lake enlargement	4,115	205	.....	4,320	.....	.....	.....	.....	.....
Kansas: Garden City	66,400	.....	.....	66,400	.....	.....	5,388	7,571	.....
Montana:									
Blackfeet	1,668,750	41,068	92,728	1,802,546	1,550	5,920	3,570	3,510	.....
Flathead	2,218,263	112,893	39,329	2,370,485	486	21,034	5,793	7,203	.....
Fort Peck	842,200	2,200	.....	844,400	20	123	1,376	1,275	.....
Huntley	1,773,165	22,190	12,600	1,807,955	1,680	1,135	12,900	17,322	.....
Milk River	4,536,209	57,772	11,197	4,605,178	7,184	7,569	8,864	10,921	.....
St. Mary storage	1,116,991	7,569	51,154	1,175,714	.....	.....	.....	.....	.....
Sun River	1,477,364	77,322	126,426	1,681,112	8,024	714	6,068	7,097	.....
Montana-North Dakota: Lower Yellowstone	6,485,482	183,017	195,013	6,863,512	21,823	.....	22,995	30,372	.....
Nebraska-Wyoming: North Platte	10,813,835	629,293	201,349	11,644,477	45,185	68,237	110,371	134,899	.....
Nevada: Truckee-Carson	9,250,039	282,899	465,381	9,998,319	26,971	47,635	103,499	112,482	[1] 29,305
New Mexico:									
Carlsbad	1,160,119	46,693	59,159	1,265,971	78,285	7,657	18,180	20,907	.....
Hondo	815,382	3,118	35,946	854,446	27,226	969	3,830	2,850	.....
New Mexico-Texas:									
Rio Grande	595,606	1,300	9,433	606,339	2,541	.....	10,177	12,116	.....
Elephant Butte storage	291,000	84,750	375,250	751,000	.....	.....	243,300	140,373	[1] 213,431
North Dakota:									
North Dakota pumping—									
Buford-Trenton unit	69,600	50	.....	69,650	.....	240	1,654	2,599	.....
Williston unit	219,100	16	.....	219,116	.....	990	2,632	3,369	.....
Oregon: Umatilla	2,550,000	136,000	44,300	2,730,300	34,600	4,200	24,940	39,116	.....
Oregon-California:									
Klamath	2,537,811	343,228	115,967	2,997,006	7,900	5,727	17,942	23,385	.....
South Dakota: Belle Fourche	6,928,070	133,750	42,130	7,103,950	1,712	68,495	53,170	68,848	.....
Utah: Strawberry Valley	787,536	70,261	181,455	1,039,252	8,821	18,280	43,736	48,500	.....
Washington:									
Okanogan	683,550	100,000	50,100	833,650	1,050	925	6,360	7,295	.....
Yakima storage unit	1,131,002	32,724	2,863	1,166,589	20,222	14,062	12,596	16,443	.....
Sunnyside unit	2,701,300	48,251	47,317	2,796,868	.....	8,980	18,020	20,520	.....
Tieton unit	759,636	470,374	257,570	1,487,580	5,423	19,087	24,562	36,783	.....
Wyoming: Shoshone	2,393,702	52,873	313,123	2,759,698	7,032	10,293	121,943	142,752	.....
Total, June, 1914	100,432,925	6,668,156	6,067,391	113,168,472	616,493	564,037	1,933,263	1,965,499	936,368
Total, June, 1913	87,492,753	6,296,118	5,456,897	99,245,768	419,790	511,322	1,344,908	1,533,544	433,887
Increase	12,940,172	372,038	610,494	13,922,704	196,703	52,715	488,355	431,955	502,481

[1] Sand-cement.

Summary of reclamation work to June 30, 1914—Continued.

Projects.	Air compressors.	Automobiles.	Boats.	Boilers.	Cableways.	Standard-gauge cars.	Narrow-gauge cars.	Concrete carts.	Dump carts.	Other carts.	Concrete mixers.	Derricks.	Dredges.	Diamond drills.	Well drills.	Percussion drills.
Arizona: Salt River	1	8	1	2	3	8	....	....	4	6	2	16	....	....	2	....
Arizona-California: Yuma	3	3	1	19	1	129	22	....	....	3	3	16	....	....	....	....
California: Orland	....	2	1	....	....	....	4	....	....	....	1	1	1	....	....	....
Colorado:																
Grand Valley	1	1	1	5	1	....	41	28	2	....	3	2	....	....	....	16
Uncompahgre Valley	5	2	....	9	....	....	78	20	1	....	3	....	....	1	....	18
Idaho:																
Boise—																
Distribution unit	....	8	2	....	....	....	43	....	20	....	6	....	....	1	....	....
Storage unit (Arrowrock)	3	....	3	3	5	58	65	3	....	....	4	9	....	2	....	25
Minidoka	1	4	2	3	....	....	....	....	....	....	3	1	1	....	....	2
Idaho-Wyoming:																
Snake River storage	....	....	....	9	....	....	....	....	....	....	....	1	....	....	....	....
Jackson Lake enlargement	....	....	1	1	....	....	....	....	....	....	1	3	1	....	....	....
Kansas: Garden City	1	....	....	1	....	....	2	....	....	....	....	....	....	....	....	....
Montana:																
Blackfeet	....	1	2	....	....	....	....	....	....	....	2	....	....	....	....	....
Flathead	....	1	2	....	....	....	6	....	6	21	3	2	....	....	....	1
Fort Peck	....	....	....	....	....	....	....	....	....	3	2	....	....	....	....	....
Huntley	....	1	....	1	....	....	....	....	2	6	....	1	....	....	....	....
Milk River	....	1	2	3	1	....	10	7	....	9	1	2	....	....	1	....
St. Mary storage	....	....	4	2	....	....	....	....	....	....	1	2	....	....	....	....
Sun River	1	2	1	5	....	....	24	6	5	9	1	2	....	2	....	9
Montana-North Dakota: Lower Yellowstone	1	2	2	1	1	....	12	....	....	....	1	6	....	....	....	....
Nebraska-Wyoming: North Platte	1	2	1	3	1	....	6	....	1	12	2	4	....	....	....	5
Nevada: Truckee-Carson	2	2	1	3	1	....	42	....	1	4	2	6	....	....	....	12
New Mexico:																
Carlsbad	....	1	1	....	....	....	5	....	....	....	1	....	....	....	....	....
Hondo	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
New Mexico-Texas:																
Rio Grande	....	5	1	....	....	1	....	....	2	....	2	....	....	....	....	....
Elephant Butte storage	2	....	....	2	3	66	5	....	22	....	3	23	....	1	2	39
North Dakota: North Dakota pumping	....	....	2	....	....	....	24	....	....	5	....	....	....	....	....	....
Oregon: Umatilla	....	....	2	....	....	....	2	5	....	6	2	7	....	....	....	....
Oregon-California: Klamath	....	2	7	1	....	....	13	....	7	....	1	3	....	....	....	4
South Dakota: Belle Fourche	1	1	....	....	....	....	36	22	....	....	....	....	....	....	....	7
Utah: Strawbetty Valley	....	2	....	1	....	2	28	12	2	3	3	2	....	....	....	15
Washington:																
Okanogan	....	1	1	....	....	....	....	4	....	....	1	....	....	....	....	4
Yakima storage unit	2	1	9	5	....	....	109	4	4	....	2	2	2	....	1	10
Sunnyside unit	....	2	....	1	....	....	....	....	....	....	2	....	....	....	1	....
Tieton unit	1	1	4	3	....	....	44	2	....	....	1	2	....	1	1	....
Wyoming: Shoshone	1	1	3	1	1	....	....	19	2	5	1	....	....	....	....	4
Washington, field offices cooperative work	....	1	1	....	....	....	....	....	....	....	....	....	....	1	....	1
Total, June, 1914	27	58	58	84	18	264	621	132	81	92	60	113	5	9	8	172
Total, June, 1913	25	42	55	73	13	171	594	133	89	92	54	97	10	8	11	154

NOTES.

Salt River.—Locomotive is electric.

California, Orland.—Narrow-gauge cars are 24-inch Koppel; not included in above, 1 screening plant. Contractors also have large equipment, including 436 horses.

Colorado, Grand Valley.—Locomotives are electric. Contractors also have equipment, including 54 horses.

Idaho, Boise, distribution unit.—Two of the 3 excavators are electric; locomotives are narrow gauge. Not included in above are 1 gasoline speeder, 1 sawmill, and 7 tongue scrapers; spring wagons include 8 buggies. Storage unit: Graders are Bagley's graders; locomotives are 3 standard gauge and 4 narrow gauge. Not included in above are an ice plant, a motor car, a gasoline speeder, a sawmill, and a sand-cement plant.

Idaho, Minidoka.—Pumps include three 4-inch diaphragms and one 2-inch centrifugal. Spring wagons include 13 buggies.

Idaho-Wyoming, Snake River storage unit.—Not included in above: 1 disk harrow, 14 steel oil barrels, and 2 ranges.

Idaho-Wyoming, Jackson Lake enlargement.—Dredge includes the following, not in above: A 25-horsepower engine and 20-horsepower hoist, 6 boilers, 2 feed pumps, one 12-inch dredging pump, and a 200-horsepower engine and 1 stiff-leg derrick.

Montana, Blackfeet.—Elevating grader includes a gas engine.

Montana, Flathead.—Cars are dump cars; other carts include 7 concrete; rollers are horse rollers; contractors have a large equipment, including 58 horses.

Summary of reclamation work to June 30, 1914—Continued.

Projects.	Electric generators.		Electric motors.		Electric-light plants.	Gasoline engines.		Steam engines.		Excavators, drag line.	Elevating graders.	Road graders.	Horses and mules.	Hydraulic rams.	Locomotives.
		Kw.		*Kw.*			*Hp.*		*Hp.*						
Arizona: Salt River	6	1,633	45	1,701	....	6	45	7	108	1	....	1	72	....	1
Arizona-California: Yuma	3	125	4	60	1	20	597	24	920	2	....	1	78	....	4
California: Orland	....	.....	1	4	....	4	22	....	.....	....	....	....	6	....	....
Colorado:															
Grand Valley	6	388	27	982	1	4	31	3	435	1	....	....	9	....	3
Uncompahgre Valley	4	350	5	111	2	....	.....	10	775	....	....	1	51	....	3
Idaho:															
Boise—															
Distribution unit	....	.....	....	.....	....	11	46	1	12	3	....	2	38	....	2
Storage unit (Arrowrock)	4	2,025	73	2,000	1	....	.....	1	40	1	3	....	35	....	7
Minidoka	1	10	9	73	1	5	159	1	10	4	....	....	44	....	....
Idaho-Wyoming:															
Snake River storage	1	50	....	.....	1	....	.....	2	45	....	1	1	.....	....	....
Jackson Lake enlargement	....	.....	....	.....	....	....	.....	7	167	....	....	....	14	....	....
Kansas: Garden City	6	470	16	349	1	5	33	....	.....	....	....	....	.....	....	....
Montana:															
Blackfeet	....	.....	....	.....	....	....	.....	....	.....	....	1	....	79	....	....
Flathead	....	.....	....	.....	....	4	13	1	40	....	1	1	102	1	....
Fort Peck	....	.....	....	.....	....	....	.....	....	.....	....	....	1	47	....	....
Huntley	....	.....	....	.....	....	3	10	....	.....	....	1	2	16	....	....
Milk River	1	15	....	.....	1	....	.....	8	140	1	....	1	71	....	....
St. Mary storage	....	.....	....	.....	2	....	.....	6	182	1	....	3	45	3	....
Sun River	....	.....	11	325	....	3	24	4	160	....	....	1	64	....	2
Montana - North Dakota:															
Lower Yellowstone	....	.....	....	.....	....	2	8	5	180	1	....	....	33	....	....
Nebraska-Wyoming: North Platte	1	45	2	13	....	7	46	9	200	2	1	1	146	1	....
Nevada: Truckee-Carson	4	1,040	25	2,265	1	5	30	3	58	2	....	2	81	1	4
New Mexico:															
Carlsbad	....	.....	....	.....	....	3	35	....	.....	1	1	1	2	1	....
Hondo	....	.....	....	.....	....	....	.....	....	.....	....	....	....	1	....	....
New Mexico-Texas:															
Rio Grande	....	.....	1	6	....	3	16	....	.....	....	....	....	38	....	....
Elephant Butte storage	5	1,530	78	2,747	....	5	103	4	65	....	....	....	11	....	4
North Dakota: North Dakota pumping	....	.....	1	2	....	....	.....	1	15	....	....	....	7	....	....
Oregon: Umatilla	....	.....	....	.....	....	6	28	3	70	1	....	....	20	....	....
Oregon-California: Klamath	....	.....	....	.....	....	3	19	2	34	2	....	1	31	....	....
South Dakota: Belle Fourche	1	3	....	.....	1	3	22	1	30	....	1	....	65	....	2
Utah: Strawberry Valley	7	1,255	3	127	1	2	45	....	.....	....	1	1	26	....	4
Washington:															
Okanogan	....	.....	....	.....	....	1	2	....	.....	....	....	....	6	1	....
Yakima storage unit	4	282	16	299	2	1	18	8	176	2	....	1	137	....	5
Sunnyside unit	....	.....	....	.....	....	4	40	2	45	....	....	1	.....	1	....
Tieton unit	1	2	....	.....	1	2	8	6	104	....	....	1	13	....	....
Wyoming: Shoshone	....	.....	....	.....	....	7	42	....	.....	3	1	3	23	3	....
Washington, field offices cooperative work	....	.....	....	.....	....	2	8	....	.....	....	....	....	.....	....	....
Total, June, 1914	55	9,221	317	11,064	17	121	1,450	119	4,011	28	12	27	1,411	12	41
Total, June, 1913	53	8,709	292	10,310	16	111	1,402	105	3,707	20	6	26	1,442	10	38

Montana, Huntley.—Pumps include one 5-inch centrifugal; excavator is an "Austin Special." Contractors have an equipment including 2 Parson's excavators.

Montana, Milk River.—Contractors also have large equipments, including 284 horses; St. Mary storage unit electric-light plants are 800 candlepower each. Light freight wagons include 2 tank wagons. Contractors also have large equipment, including 650 horses.

Montana, Sun River.—Narrow-gauge cars include 4 yard dump and 1 flat car. Locomotives are narrow gauge. Contractors also have large equipment, including 475 horses.

Montana-North Dakota, Lower Yellowstone.—Derricks include 3 stiff-leg and 3 guy derricks.

Nebraska-Wyoming, North Platte.—Excavators include 1 trench machine; spring wagons include 5 buggies. Contractors also have large equipment, including 317 horses.

Nevada, Truckee-Carson.—Drills include 7 steam and 1 electric. Steam shovels include 1 electric shovel. Not included in above are 1 track speeder and 3 back-up scrapers.

New Mexico, Rio Grande.—Pumps include 3 diaphragm, 1 centrifugal, and 3 hand pumps.

Summary of reclamation work to June 30, 1914—Continued.

Projects.	Motor cycles.	Pile drivers.	Plows.	Pumps.	Rock crushers.	Rollers.	Fresno scrapers.	Slip scrapers.	Wheel scrapers.	Sleighs and sleds.	Sprinklers.	Steam shovels.	Traction engines.	Dump wagons.	Heavy freight wagons.	Light freight wagons.	Spring wagons.
Arizona: Salt River	21	....	35	34	1	....	115	118	7	....	....	....	....	....	....	80	15
Arizona-California: Yuma	3	1	36	50	2	....	140	12	15	....	1	2	....	4	19	14	6
California: Orland	1	1	7	7	....	....	8	8	4	....	....	....	....	....	2	3	4
Colorado:																	
Grand Valley	....	1	3	8	2	....	....	15	10	....	....	....	....	....	3	....	5
Umcompahgre Valley	2	4	14	17	1	....	27	151	36	2	....	....	....	4	17	....	4
Idaho:																	
Boise—																	
Distribution unit	4	....	38	25	....	....	73	55	14	....	....	....	....	....	11	11	17
Storage unit (Arrowrock)	....	1	12	15	3	....	3	33	8	5	....	1	....	....	14	....	2
Minidoka	4	1	7	4	....	3	4	18	10	1	....	....	....	....	2	10	20
Idaho-Wyoming:																	
Snake River Storage	....	1	....	....	....	....	11	75	24	....	....	....	....	....	....	....	....
Jackson Lake enlargement	....	2	1	8	....	....	....	9	....	8	....	....	....	....	....	2	2
Kansas: Garden City	....	....	3	31	....	....	....	....	....	....	....	....	....	....	....	....	....
Montana:																	
Blackfeet	3	1	27	9	....	....	12	92	17	....	....	....	....	....	13	10	6
Flathead	1	....	25	1	....	2	47	48	20	16	....	2	1	15	27	6	6
Fort Peck	1	....	28	1	....	....	103	7	6	2	....	....	....	....	2	9	3
Huntley	1	....	11	6	....	....	2	50	10	....	....	....	....	....	3	3	5
Milk River	1	4	11	13	....	....	17	25	17	6	....	....	....	8	4	12	3
St. Mary storage	....	1	24	14	....	....	6	21	....	4	....	1	....	7	13	7	4
Sun River	2	2	7	12	....	1	5	11	18	7	....	1	1	24	18	9	7
Montana-North Dakota:																	
Lower Yellowstone	1	3	12	14	....	....	13	49	14	7	....	....	....	4	8	4	5
Nebraska-Wyoming: North Platte	1	....	23	25	1	....	19	80	55	....	....	....	....	17	8	45	26
Nevada: Truckee-Carson	1	1	14	34	1	1	39	37	19	....	....	3	2	35	19	7	6
New Mexico:																	
Carlsbad	....	....	6	4	....	1	11	36	25	....	1	....	....	15	3	....	....
Hondo	....	....	....	1	....	....	....	5	....	....	....	....	....	....	....	1	....
New Mexico-Texas:																	
Rio Grande	....	....	4	7	....	....	3	6	....	....	....	....	....	....	....	2	9
Elephant Butte storage	....	....	1	27	5	....	6	6	....	....	1	....	....	2	18	4	2
North Dakota: North Dakota pumping	....	....	2	....	....	....	1	8	....	....	....	....	....	....	1	1	2
Oregon: Umatilla	....	....	9	15	....	....	23	20	3	1	....	....	....	....	7	1	3
Oregon-California: Klamath	2	1	20	6	1	1	38	19	23	2	....	....	....	1	14	8	8
South Dakota: Belle Fourche	....	....	14	5	....	....	17	30	34	....	....	1	1	13	6	16	10
Utah: Strawberry Valley	....	....	13	14	1	....	15	31	8	8	....	....	....	2	1	8	3
Washington:																	
Okanogan	....	2	4	....	1	....	2	8	8	1	....	....	....	....	....	1	3
Yakima storage unit	1	1	11	16	1	1	23	51	23	14	....	1	2	7	20	5	4
Sunnyside unit	....	1	9	3	....	....	15	23	11	....	....	....	....	....	....	5	....
Tieton unit	....	1	5	7	....	....	4	6	2	1	....	....	....	....	4	3	4
Wyoming: Shoshone	2	....	21	19	....	....	22	39	10	....	....	....	....	....	....	17	9
Washington, field offices cooperative work	1	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Total, June, 1914	53	30	457	455	20	10	824	1,202	441	85	3	13	7	158	262	304	203
Total, June, 1913	50	23	437	434	21	8	782	1,209	388	82	9	14	6	169	245	298	225

New Mexico, Rio Grande, Elephant Butte storage.—Percussion drills include 2 Chamdere and 1 Calyx drill. Not included in above are 1 cement gun, 1 grouting machine, 2 drill sharpeners, 1 motor car, and 126 skips.

Oregon-California, Klamath.—Boats include 2 launches and 2 barges; pumps include 2 diaphragm, 1 gear operated, and 3 centrifugal; spring wagons include 3 buggies. Not included in the above are a hay baler 3 harrows, 2 mowers, 1 set of sand-crushing rolls. Pile driver includes hammer only.

South Dakota, Belle Fourche.—Locomotives are 36-inch gauge. Contractors also have large equipment, including 125 horses.

Utah, Strawberry Valley.—Other carts are concrete carts. Percussion drills include 9 air and 6 electric rock drills. Locomotives are electric.

Washington, Okanogan.—Percussion drills are steam drills. Pile drivers include hammer only.

Washington, Yakima storage unit.—Boats include 3 gasoline launches. Electric motors include 2 hoists, with 44 total horsepower.

Washington, Yakima, Tieton unit.—Narrow-gauge cars are shape-transporting cars. Spring wagons include 3 buggies and hacks. Contractors have an equipment including 12 horses.

Wyoming, Shoshone.—Excavator includes 1 Austin trenching machine.

Summary of reclamation work to June 30, 1914—Continued.

Projects.	Average force of employees (January to June).						Maximum force of employees (January to June).						Average, all employees, June, 1914.	Approximate average wages per day for common labor.
	Classified, educational.	Classified, noneducational.	Others.	Total.	Contractors.	Grand total.	Classified, educational.	Classified, noneducational.	Others.	Total.	Contractors.	Grand total.		
Arizona: Salt River	20	100	300	420	....	420	23	130	450	603	.....	603	502	$2.00
Arizona-California: Yuma	10	71	475	556	....	556	10	75	825	910	.....	910	835	2.00
California: Orland	5	9	18	32	67	99	5	14	26	45	101	146	128	2.50
Colorado: Grand Valley	12	40	312	364	42	406	13	46	376	435	70	505	368	2.25
Uncompahgre Valley	13	45	125	183	40	223	14	60	175	249	60	309	177	2.12
Idaho: Boise—Distribution unit	32	86	536	654	....	654	33	92	587	712	.....	712	215	2.30
Storage unit (Arrowrock)	10	175	648	833	....	833	10	224	846	1,080	.....	1,080	1,080	2.50
Minidoka	19	92	237	348	....	348	19	125	411	555	.....	555	462	2.25
Idaho-Wyoming: Snake River storage	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jackson Lake enlargement	3	5	45	53	....	53	7	26	139	172	.....	172	172	2.50
Kansas: Garden City	....	.....	1	1	....	1	....	.....	1	1	.....	1	1	.....
Montana: Blackfeet	6	8	97	111	....	111	7	14	360	381	.....	381	87	2.40
Flathead	14	39	113	166	30	196	16	45	172	233	81	314	127	2.50
Fort Peck	6	7	90	103	....	103	7	13	260	280	.....	280	218	2.50
Huntley	9	9	71	89	5	94	9	12	203	224	15	239	131	2.50
Milk River	19	18	115	152	102	154	21	22	221	264	200	464	308	2.50
St. Mary storage	11	5	80	96	213	309	12	7	149	168	275	443	318	2.50
Sun River	21	27	112	160	220	388	24	30	136	190	540	730	361	2.25
Montana-North Dakota: Lower Yellowstone	5	11	49	65	....	65	6	19	122	147	.....	147	77	2.25
Nebraska-Wyoming: North Platte	16	46	112	174	63	237	16	84	219	319	173	492	329	2.12
Nevada: Truckee-Carson	15	62	240	317	....	317	15	64	254	333	.....	333	316	2.20
New Mexico: Carlsbad	3	11	131	145	18	163	3	11	222	236	37	273	83	1.50
Hondo	....	1	5	6	....	6	....	1	27	28	.....	28	8	1.76
New Mexico-Texas: Rio Grande	17	58	368	443	....	443	19	74	826	919	.....	919	166	1.25
Elephant Butte storage	14	91	960	1,065	....	1,065	15	107	1,036	1,158	.....	1,158	1,130	1.67
North Dakota: North Dakota pumping	2	6	26	34	....	34	3	6	51	60	.....	60	46	2.50
Oregon: Umatilla	8	15	100	123	....	123	9	24	149	182	.....	182	182	2.40
Oregon - California: Klamath	6	10	76	92	10	102	6	17	138	161	25	186	63	2.48
South Dakota: Belle Fourche	7	16	48	71	32	103	7	34	120	161	40	201	186	2.24
Utah: Strawberry Valley	6	15	9	30	....	30	9	18	28	55	.....	55	55	2.50
Washington: Okanogan	4	4	25	33	....	33	5	10	65	80	.....	80	37	2.50
Yakima storage unit	12	35	225	272	....	272	20	90	425	535	.....	535	475	2.20
Sunnyside unit	9	27	15	51	....	51	10	28	50	88	.....	88	51	2.20
Tieton unit	4	21	55	80	12	92	4	29	108	141	20	161	127	2.00
Wyoming: Shoshone	8	24	106	138	....	138	10	42	197	249	.....	249	146	2.40
Washington, field offices cooperative work	168	18	29	215	....	215	176	48	84	308	.....	308	261	.....
Total, June, 1914	514	1,207	5,954	7,675	854	8,437	563	1,641	9,458	1,662	1,637	3,299	9,228	2.23
Total, June, 1913	1,479		3,936	5,415	655	6,070	1,810		6,613	8,423	1,073	9,496	7,616	.....

CROP STATISTICS AND OPERATION AND MAINTENANCE DATA.

Acreage cropped and irrigated, 1913.

State and project.	Irrigated for crop production.											
	Grain.								Hay.			
	Barley.	Corn, Indian.	Corn, sorghum.	Flax.	Oats.	Rye.	Wheat.	Total.	Alfalfa.	Clover.	Other.	Total.
Arizona: Salt River	24,946	1,889	.....	.....	2,399	.....	9,493	38,727	84,764	.....	2,166	86,930
Arizona-California:												
Yuma	1,201	289	2,928	.....	.....	.....	384	4,802	10,321	.....	985	11,306
California: Orland	.....	21	.....	.....	.....	.....	.....	21	5,084	.....	.....	5,084
Colorado: Uncompahgre	97	117	.....	.....	4,797	14	3,931	8,956	10,545	144	444	11,133
Idaho:												
Boise	2,315	2,862	.....	.....	6,877	315	12,042	24,411	15,428	1,368	563	17,359
Minidoka—												
Gravity unit	662	211	.....	9	5,608	288	3,849	10,627	17,427	858	620	18,905
Pumping unit	945	52	.....	.....	4,853	7	6,825	12,682	8,417	143	39	8,599
Total	1,607	263	.....	9	10,461	295	10,674	23,309	25,844	1,001	659	27,504
Montana:												
Flathead	122	3	.....	3	2,552	.....	1,225	3,905	53	147	267	467
Fort Peck	.....	.....	.....	20	.....	.....	.....	40	.....	.....	.....	360
Huntley	191	326	.....	89	3,942	.....	1,224	5,772	4,848	.....	335	5,183
Milk River	35	.....	.....	178	260	.....	1,139	1,612	215	.....	623	838
Sun River	240	.....	.....	179	2,636	10	943	4,008	1,623	.....	467	2,090
Montana-North Dakota:												
Lower Yellowstone	1,027	.....	.....	282	1,160	.....	3,136	5,605	1,407	.....	150	1,557
Nebraska: North Platte	2,331	3,561	.....	.....	8,590	928	2,182	17,592	27,298	.....	.....	27,298
Nevada: Truckee-Carson	1,880	.....	.....	.....	283	.....	1,590	3,753	18,483	.....	3,467	21,950
New Mexico:												
Carlsbad	.....	278	1,232	.....	90	.....	1	1,601	7,891	.....	.....	7,891
Hondo	.....	.....	.....	.....	.....	.....	.....	.....	648	.....	.....	648
New Mexico-Texas: Rio Grande	108	2,923	.....	.....	808	.....	1,540	5,379	19,524	.....	.....	19,524
North Dakota: North Dakota pumping, Williston unit	141	4	.....	30	131	.....	105	411	1,092	.....	83	1,175
Oregon:												
Umatilla	.....	56	.....	.....	.....	.....	.....	56	2,024	20	42	2,086
Klamath	3,972	.....	.....	.....	1,601	8	583	6,164	8,399	.....	1,950	10,349
South Dakota: Belle Fourche	744	1,859	.....	219	5,343	71	13,096	21,332	7,388	.....	2,533	9,921
Washington:												
Okanogan	.....	191	.....	.....	.....	.....	.....	191	.....	.....	.....	1,456
Yakima—												
Sunnyside unit	.....	4,516	.....	.....	.....	.....	141	4,657	24,137	1,121	1,783	27,041
Tieton unit	136	1,088	.....	.....	1,130	.....	345	2,699	3,284	325	1,490	5,099
Wyoming:												
Shoshone	313	7	.....	.....	3,211	.....	2,488	6,019	10,945	33	201	11,179
Total	41,406	20,253	4,160	1,009	56,271	1,641	66,262	191,022	291,245	4,159	18,208	315,428
Per cent	6.5	3.2	0.6	0.2	8.8	0.3	10.3	29.8	45.4	0.6	2.8	49.1
Total, 1912	40,052	21,297	4,431	4,193	64,626	1,953	72,829	209,381	243,333	4,914	31,291	279,538
Per cent	6.1	5.3	0.7	0.6	9.8	0.3	11.1	33.9	37.1	0.8	4.8	42.7
Total, 1911	28,320	14,177	2,030	2,156	55,007	2,124	76,538	180,352	253,576	.....	19,432	273,008
Per cent	4.7	2.3	0.4	0.3	9.1	0.4	12.7	29.9	42.0	.....	3.2	45.2

Acreage cropped and irrigated, 1913—Continued.

State and project.	Irrigated for crop production—Continued.												
	Vegetables.						Fruit.						
	Beans.	Onions.	Potatoes, common.	Potatoes, sweet.	Truck.	Total.	Apples.	Citrus.	Peaches.	Pears.	Prunes.	Small.	Total.
Arizona: Salt River	1,623	....	478	....	2,500	4,601	.....	707	.....	.....	.....	285	2,428
Arizona-California: Yuma	54	....	.....	....	264	318	.....	.....	.....	.....	.....	.....	47
California: Orland	.....	.....	.....	....	71	71	.....	71	.....	.....	20	11	171
Colorado: Uncompahgre	55	160	5,354	....	81	5,650	1,561	.....	195	14	23	40	1,833
Idaho:													
Boise	119	9	1,255	13	463	1,859	91	.....	39	.....	8	6	144
Minidoka—													
Gravity unit	27	15	1,396	....	298	1,736	250	.....	.....	2	4	54	310
Pumping unit	67	1	3,159	....	307	3,534	12	.....	.....	2	....	5	19
Total	94	16	4,555	....	605	5,270	262	.....	.....	4	4	59	329
Montana:													
Flathead	1	....	49	....	35	85	2	.....	.....	.....	.....	.....	2
Fort Peck	.....	.....	.....	....	10	10	.....	.....	.....	.....	.....	.....	.....
Huntley	39	....	99	....	258	396	.....	.....	.....	.....	.....	.....	.....
Milk River	.....	.....	4	....	2	6	.....	.....	.....	.....	.....	.....	.....
Sun River	.....	.....	181	....	32	213	.....	.....	.....	.....	.....	.....	.....
Montana-North Dakota: Lower Yellowstone	.....	.....	41	....	28	69	.....	.....	.....	.....	.....	.....	.....
Nebraska: North Platte	.....	.....	1,156	....	300	1,456	.....	.....	.....	.....	.....	.....	.....
Nevada: Truckee-Carson	.....	38	416	....	180	634	.....	.....	.....	.....	.....	.....	.....
New Mexico:													
Carlsbad	2	....	.....	16	31	49	10	.....	175	.....	....	1	186
Hondo	.....	.....	.....	....	.....	.....	44	.....	30	.....	....	6	80
New Mexico-Texas: Rio Grande	472	....	.....	....	995	1,467	.....	.....	.....	.....	....	94	423
North Dakota: North Dakota pumping, Williston unit	1	3	45	....	26	75	.....	.....	.....	.....	.....	.....	.....
Oregon:													
Umatilla	.....	3	83	....	59	145	11	13	87	.....	....	133	244
Klamath	.....	.....	212	....	87	299	.....	.....	.....	.....	.....	.....	.....
South Dakota: Belle Fourche	67	....	298	....	177	542	.....	.....	.....	.....	.....	.....	.....
Washington:													
Okanogan	14	2	161	....	140	317	.....	.....	.....	.....	.....	.....	924
Yakima—													
Sunnyside unit	.....	.....	4,694	....	657	5,351	6,291	.....	1,186	594	198	461	8,730
Tieton unit	223	33	3,700	....	185	4,141	394	.....	168	75	....	33	670
Wyoming:													
Shoshone	5	1	168	....	239	413	.....	.....	.....	.....	.....	.....	.....
Total	2,769	265	22,949	29	7,425	33,437	8,666	791	1,880	687	253	1,129	16,211
Per cent	0.4	0	3.6	0	1.2	5.2	1.4	0.1	0.3	0.1	0	0.2	2.5
Total, 1912	591	....	.....	....	7,183	.....	.....	.....	.....	.....	.....	.....	14,917
Per cent	0.1	....	.....	....	1.1	.....	.....	.....	.....	.....	.....	.....	2.3
Total, 1911	1,589	197	14,985	....	3,994	20,765	.....	.....	.....	.....	.....	.....	18,000
Per cent	0.3	0	2.5	....	0.7	3.5	.....	.....	.....	.....	.....	.....	3.0

Acreage cropped and irrigated, 1913—Continued.

State and project.	Irrigated for crop production—Continued.														
	Seed.				Other crops.									Duplicated areas.	Total cropped.
	Alfalfa.	Clover.	Millet.	Total.	Beets, sugar.	Cane.	Corn, fodder.	Cotton.	Field peas.	Hops.	Pasture.	Miscellaneous.	Total.		
Arizona: Salt River					1,523	487	22,572	4,545			11,638		40,765	11,809	161,642
Arizona-California: Yuma	3,388			3,388			598	62			1,007	10,321	11,988	15,123	16,726
California: Orland							95				3,455	5	3,555	2,913	5,987
Colorado: Uncompahgre	18	20		38	2,262		57		241		950	82	3,592	836	30,366
Idaho:															
Boise	344	3,244	48	3,636	2		96		30		2,976	123	3,225	1,447	[1] 50,865
Minidoka—Gravity unit		29		29	472		5		46		4,609	381	5,513	241	36,879
Pumping unit	24	50		74	2,102		19		462		1,892		4,475	20	29,362
Total	24	79		103	2,574		24		508		6,501	381	9,988	261	66,241
Montana:															
Flathead			2	2	1		6		6		106		119		4,579
Fort Peck															410
Huntley					4,475								4,475	28	15,798
Milk River					3								3		2,459
Sun River	69		3	72	3				5		416		424		6,807
Montana-North Dakota: Lower Yellowstone											97	82	179		7,410
Nebraska: North Platte	2,946			2,946	2,920						1,200	894	5,014		54,306
Nevada: Truckee-Carson					1,079						18,352	336	19,767	3,161	42,943
New Mexico: Carlsbad	2,894	3	1	2,898		142	223	1,510			581	2,189	4,645	5,075	12,195
Hondo						80							80		808
New Mexico-Texas: Rio Grande	54			54			20				146	1,047	1,213	1,340	26,720
North Dakota: North Dakota pumping, Williston unit	3			3					3		19		22		1,686
Oregon:															
Umatilla							76		3		496	9	581	79	3,033
Klamath											2,116		2,116		18,928
South Dakota: Belle Fourche	1,576		54	1,630	8		709				285		1,002	1,859	32,568
Washington: Okanogan											47	28	75	227	2,736
Yakima—Sunnyside unit										159	2,322	313	2,794	2,343	46,230
Tieton unit							195		6	238	410		849	863	12,595
Wyoming: Shoshone	151	15		166	9	6	3		1		382		401		18,178
Total	11,467	3,361	108	14,936	14,859	715	24,674	6,117	800	397	53,502	15,810	116,872	47,364	642,216
Per cent	1.8	0.5	0	2.3	2.3	0.1	3.8	1.0	0.1	0.1	8.3	2.5	18.2	7.4	100.00
Total, 1912	8,188		99	8,287	14,121	685	1,431	1,275							539,934
Per cent	1.2		0	1.2	2.1	0.1	0.2	0.2							
Total, 1911					8,214	343		3,606		417	47,128		59,708		470,100
Per cent					1.4	0.1		0.6		0.1	7.8		10.0		
Total, 1910															412,894

[1] Includes 1,674 acres cropped but not reported in detail; cropped area assumed from 1,918 acres irrigated area in same proportion as for rest of project.

Acreage cropped and irrigated, 1913—Continued.

State and project.	Irrigated for—					Total irrigated.			
	Nonbearing orchard.	Young alfalfa.	Fall plowing.	Miscellaneous.	Duplicated areas.	1913	1912	1911	1910
Arizona: Salt River	290	.....	.....	1,380	.....	163,312	128,628	115,514	106,000
Arizona-California: Yuma	.....	.....	.....	2,881	.....	19,607	13,767	8,570	8,600
California: Orland	493	.....	.....	137	.....	6,617	4,230	2,663	700
Colorado: Uncompahgre	1,414	2,214	774	60	3,400	31,428	27,887	20,995	17,080
Idaho:									
Boise	6,063	5,892	1,053	588	6,440	58,265	36,798	27,575	33,377
Minidoka—									
Gravity unit	947	4,161	1,830	969	913	43,873	40,615	48,615	26,707
Pumping unit	493	2,483	400	1,342	1,996	32,084	29,623	22,220	11,000
Total	1,440	6,644	2,230	2,311	2,909	75,957	70,238	70,835	37,707
Montana:									
Flathead	32	20	.....	.....	.....	4,631	4,203	2,370	2,000
Fort Peck	.....	.....	.....	.....	.....	410	.....	.....	.....
Huntley	.....	.....	.....	.....	.....	15,798	14,425	12,000	8,000
Milk River	.....	.....	.....	241	155	2,545	351	2,070	.....
Sun River	.....	.....	.....	612	.....	7,419	6,824	6,892	4,194
Montana-North Dakota: Lower Yellowstone	.....	.....	.....	250	.....	7,660	5,068	15,443	8,655
Nebraska: North Platte	.....	9,292	.....	.....	6,769	56,829	50,205	44,736	48,537
Nevada: Truckee-Carson	132	4,523	.....	.....	4,523	43,075	36,620	30,139	27,557
New Mexico:									
Carlsbad	232	1,468	.....	365	.....	14,260	13,459	14,803	13,155
Hondo	.....	.....	.....	124	.....	932	1,261	1,135	1,300
New Mexico-Texas: Rio Grande	1,003	.....	.....	.....	.....	27,723	23,115	25,980	22,600
North Dakota: North Dakota pumping, Williston unit	.....	98	.....	53	98	1,739	323	2,426	1,403
Oregon:									
Umatilla	1,441	296	.....	922	698	4,994	4,600	3,515	2,574
Klamath	.....	.....	.....	.....	.....	18,928	23,834	23,869	27,108
South Dakota: Belle Fourche	.....	191	.....	122	.....	32,881	27,897	19,810	15,410
Washington:									
Okanogan	5,795	.....	.....	80	911	7,700	7,260	6,467	4,400
Yakima—									
Sunnyside unit	9,831	2,361	.....	3,929	4,051	58,300	55,800	51,040	48,255
Tieton unit	6,740	.....	545	2,285	3,415	18,750	15,008	7,180	1,695
Wyoming:									
Shoshone	101	2,598	76	31	1,561	19,423	16,524	16,216	14,701
Buford-Trenton	.....	.....	.....	.....	.....	.....	.....	1,163	457
Total	35,007	35,624	4,678	16,371	34,930	699,183	588,370	533,406	455,438

Average crop yields per acre, 1913.

State and project.	Hay.				Grain.							
	Alfalfa.	Clover.	Other.	Total.	Barley.	Corn, Indian.	Corn, sorghum.	Flax.	Oats.	Rye.	Wheat.	Total.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*
Arizona: Salt River	4.0	.....	2.0	4.0	30.0	20.0	.....	.....	35.0	.....	28.0	29.0
Arizona-California: Yuma	3.7	.....	1.5	3.5	31.0	13.0	38.5	.....	.....	.....	20.1	34.0
California: Orland	3.03	.....	.....	4.3	.....	16.7	.....	.....	.....	.....	.....	16.7
Colorado: Uncompahgre	2.7	0.6	1.3	2.6	39.3	40.0	.....	.....	29.0	21.6	21.7	26.0
Idaho: Boise	3.5	1.54	1.28	3.3	18.7	20.0	.....	.....	24.35	3.4	15.8	19.0
Idaho:												
Minidoka—												
Gravity unit	3.0	2.89	2.25	3.0	30.4	18.6	.....	1.55	30.1	20.0	23.0	27.0
Pumping unit	3.0	2.16	1.46	3.0	24.7	10.2	.....	.....	27.9	15.0	21.0	24.0
Total	3.0	2.8	2.2	3.0	27.0	17.0	.....	1.55	29.0	20.0	22.0	25.0
Montana:												
Flathead	1.7	1.4	.8	1.1	16.0	62.0	.....	8.0	38.0	.....	16.0	30.0
Fort Peck	.....	.....	.....	1.0	.....	.....	.....	8.0	.....	.....	.....	11.5
Huntley	3.45	.....	1.8	3.3	13.3	16.6	.....	6.1	28.9	.....	18.0	25.0
Milk River	1.9	.....	.85	1.1	10.8	.....	.....	8.0	27.2	.....	11.7	13.8
Sun River	2.25	.....	1.02	2.0	25.5	.....	.....	10.0	29.5	10.0	19.0	26.0
Lower Yellowstone	2.3	.....	1.0	2.2	22.5	.....	.....	10.2	31.0	.....	17.6	21.0
Nebraska-Wyoming: North Platte	2.3	.....	.....	2.3	21.0	19.0	.....	.....	25.0	7.0	15.0	21.0
Nevada: Truckee Carson	2.5	.....	1.15	2.3	23.0	.....	.....	.....	36.0	.....	19.0	22.0
New Mexico:												
Carlsbad	1.6	.....	.....	1.6	.....	15.9	13.8	.....	15.4	.....	30.0	14.0
Hondo	1.67	.....	.....	1.67	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico-Texas: Rio Grande	2.1	.....	.....	2.1	12.3	6.7	.....	.....	25.9	.....	13.2	12.0
North Dakota: North Dakota pumping, Williston unit	1.9	.....	.64	1.8	22.2	19.6	.....	18.0	30.4	.....	12.4	22.0
Oregon:												
Umatilla	3.96	1.7	.9	3.9	.....	19.4	.....	.....	.....	.....	.....	19.0
Klamath	2.2	.....	1.58	2.1	29.0	.....	.....	.....	37.2	15.0	15.8	30.0
South Dakota: Belle-fourche	2.1	.....	.9	1.8	24.3	19.1	.....	4.7	30.3	10.8	14.9	19.0
Washington:												
Okanogan	.....	.....	.....	2.9	.....	21.0	.....	.....	.....	.....	.....	21.0
Yakima—												
Sunnyside unit	5.0	3.5	3.0	4.8	.....	50.0	.....	.....	.....	.....	.....	50.0
Tieton unit	3.4	2.2	1.9	2.9	34.2	26.0	.....	.....	21.0	.....	32.4	25.0
Wyoming: Shoshone	2.31	.3	.83	2.3	18.0	11.33	.....	.....	26.35	.....	14.1	21.0
Average	3.2	2.4	1.6	3.1	28.0	25.0	31.0	8.3	28.5	8.9	18.8	25.0
Average, 1912	3.1	3.0	1.0	.....	28.0	25.0	23.0	12.0	32.0	9.0	19.9	.....

Average crop yields per acre, 1913—Continued.

State and project.	Vegetables.				Fruit.						
	Beans.	Onions.	Potatoes, common.	Potatoes, sweet.	Apples.	Citrus.	Peaches.	Pears.	Prunes.	Small.	Total.
	Bush.	*Bush.*	*Bush.*	*Bush.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
Arizona: Salt River	16.0	.....	40.0	.....	.....	3,000	.....	.....	.....	3,000	3,890
Arizona-California: Yuma	7.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California: Orland	.....	.....	.....	.....	.....	7,100	.....	.....	5,000	3,250	4,615
Colorado: Uncompahgre	13.7	246.0	135.0	.....	4,548	.....	9.4	229	4,108	1,054	3,950
Idaho: Boise	11.9	81.0	90.0	35.5	8,096	.....	658	.....	4,637	4,260	5,750
Idaho:											
Minidoka—											
Gravity unit	19.0	98.0	151.0	.....	547	.....	.....	323	213	480	530
Pumping unit	10.7	200.0	111.0	.....	1,396	.....	.....	400	.....	2,700	1,630
Total	13.1	99.0	123.0	.....	586	.....	.....	362	213	668	594
Montana:											
Flathead	.....	.....	86.0	.....	4,060	.....	.....	.....	.....	.....	4,060
Fort Peck	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huntley	7.9	.....	120.0	.....	.....	.....	.....	.....	.....	.....	.....
Milk River	.....	.....	129.0	.....	.....	.....	.....	.....	.....	.....	.....
Sun River	.....	.....	104.0	.....	.....	.....	.....	.....	.....	.....	.....
Lower Yellowstone	.....	.....	113.0	.....	.....	.....	.....	.....	.....	.....	.....
Nebraska-Wyoming: North Platte	.....	.....	131.0	.....	.....	.....	.....	.....	.....	.....	.....
Nevada: Truckee Carson	.....	287.0	72.0	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico:											
Carlsbad	6.0	.....	.....	50.5	1,620	.....	4,255	.....	.....	1,583	4,090
Hondo	.....	.....	.....	.....	1,511	.....	1,110	.....	.....	208	890
New Mexico-Texas: Rio Grande	2.6	.....	.....	.....	.....	.....	.....	.....	.....	412	1,350
North Dakota: North Dakota pumping, Williston unit	24.0	.....	122.0	.....	.....	.....	.....	.....	.....	.....	.....
Oregon:											
Umatilla	.....	145.0	91.0	.....	164	10,692	715	.....	.....	490	1,100
Klamath	.....	.....	98.4	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota: Bellefourche	6.7	.....	86.3	.....	.....	.....	.....	.....	.....	.....	.....
Washington:											
Okanogan	11.33	88.0	100.0	.....	.....	.....	.....	.....	.....	.....	1,130
Yakima—											
Sunnyside unit	.....	.....	264.0	.....	4,160	.....	6,000	8,390	10,000	.....	4,870
Tieton unit	5.4	94	198.0	.....	3,760	.....	5,450	1,410	.....	2,534	3,860
Wyoming: Shoshone	1.33	72.0	68.0	.....	.....	.....	.....	.....	.....	.....	.....
Average	12.0	213.0	161.0	44.0	4,120	3,490	4,710	7,420	8,740	1,760	4,080
Average, 1912	13.0	274.0	146.0	118.0	13,600	5,680	10,200	12,840	.....	.....	9,800

Average crop yields per acre, 1913—Continued.

State and project.	Seed.			Other crops.					
	Alfalfa.	Clover.	Millet.	Beets, sugar.	Cane.	Corn fodder.	Cotton.	Peas, field.	Hops.
	Bush.	*Bush.*	*Bush.*	*Tons.*	*Tons.*	*Tons.*	*Lbs.*	*Bush.*	*Lbs.*
Arizona: Salt River	.....	.....	.....	8.5	15.0	0.75	375	.....	.....
Arizona-California: Yuma	5.6	.....	.....	.....	.....	2.86	316	.....	.....
California: Orland	.....	.....	.....	.....	.....	.73	.....	.....	.....
Colorado: Uncompahgre	1.6	.8	.....	7.5	.....	2.4	.....	1.9	.....
Idaho: Boise	1.74	4.64	6.76	5.0	.....	3.27	.....	4.9	.....
Idaho:									
Minidoka—									
Gravity unit	.....	4.86	.....	9.76	.....	1.8	.....	24.0	.....
Pumping unit	3.75	3.4	.....	8.26	.....	2.9	.....	16.8	.....
Total	3.75	3.9	.....	8.6	.....	2.6	.....	17.5	.....
Montana:									
Flathead	.....	.....	18.0	5.0	.....	8.0	.....	8.0	.....
Fort Peck	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huntley	.....	.....	.....	10.2	.....	.....	.....	.....	.....
Milk River	.....	.....	.....	2.0	.....	.....	.....	.....	.....
Sun River	0.5	.....	15.0	6.33	.....	.....	.....	20.0	.....
Lower Yellowstone	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nebraska-Wyoming: North Platte	1.1	.....	.....	11.0	.....	.....	.....	.....	.....
Nevada: Truckee Carson	.....	.....	.....	8.76	.....	.....	.....	.....	.....
New Mexico:									
Carlsbad	2.37	4.66	12.0	.....	2.62	2.47	199	.....	.....
Hondo	.....	.....	.....	.....	1.19	.....	.....	.....	.....
New Mexico-Texas: Rio Grande	3.7	.....	.....	.....	.....	1.5	.....	.....	.....
North Dakota: North Dakota pumping, Williston unit	1.2	.....	.....	.....	.....	.....	.....	.....	.....
Oregon:									
Umatilla	.....	.....	.....	.....	.....	2.8	.....	.....	.....
Klamath	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota: Bellefourche	1.4	.....	5.8	5.9	.....	1.0	.....	.....	.....
Washington:									
Okanogan	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yakima—									
Sunnyside unit	.....	.....	.....	.....	.....	.....	.....	.....	1,893
Tieton unit	.....	.....	.....	.....	.....	3.7	.....	19.5	808
Wyoming: Shoshone	1.16	4.0	.....	7.68	.5	1.43	.....	13.33	.....
Average	2.8	4.6	6.7	9.4	11.0	.9	331	12.0	1,240
Average, 1912	3.4	.....	13.0	9.1	2.9	3.3	201	22.0	1,500

Total crop yields, 1913.

State and project.	Hay.				Grain.							
	Alfalfa.	Clover.	Other.	Total.	Barley.	Corn, Indian.	Corn, sorghum.	Flax.	Oats.	Rye.	Wheat.	Total.
	Ton.	*Ton.*	*Ton.*	*Ton.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
Arizona: Salt River	339,056	.....	4,332	343,388	748,373	37,770	.....	.....	83,983	.....	265,790	1,135,916
Arizona-California: Yuma	38,100	.....	1,485	39,585	37,370	3,752	112,597	.....	.....	.....	7,705	161,424
California: Orland	15,324	.....	.....	15,324	.....	342	.....	.....	.....	.....	.....	342
Colorado: Uncompahgre	28,715	81	574	29,370	3,815	4,683	.....	.....	139,247	302	85,192	233,239
Idaho: Boise	54,163	2,112	723	56,998	43,270	57,819	.....	.....	167,464	1,061	190,172	459,786
Idaho:												
Minidoka—												
Gravity unit	53,055	2,482	1,393	56,930	20,147	3,928	.....	14	168,720	5,855	87,706	286,370
Pumping unit	25,389	308	57	25,754	23,315	530	.....	.....	135,410	105	144,195	303,555
Total	78,444	2,790	1,450	82,684	43,462	4,458	.....	14	304,130	5,960	231,901	589,925
Montana:												
Flathead	90	208	214	512	1,953	156	.....	24	95,929	.....	19,475	117,537
Fort Peck	.....	.....	.....	360	.....	.....	.....	160	.....	.....	.....	460
Huntley	16,725	.....	608	17,333	2,535	5,418	.....	539	113,766	.....	21,880	144,138
Milk River	401	.....	530	931	377	.....	.....	1,429	7,084	.....	13,301	22,191
Sun River	3,707	.....	478	4,185	6,166	.....	.....	1,781	76,949	100	17,837	102,833
Montana-North Dakota: Lower Yellowstone	3,231	.....	150	3,381	23,140	.....	.....	2,870	36,393	.....	55,084	117,487
Nebraska-Wyoming: North Platte	61,728	.....	.....	61,728	49,522	67,001	.....	.....	211,599	6,273	32,489	366,884
Nevada: Truckee-Carson	45,635	.....	4,001	49,636	43,238	.....	.....	.....	10,274	.....	30,271	83,783
New Mexico:												
Carlsbad	12,760	.....	.....	12,760	.....	4,411	17,045	.....	1,388	.....	30	22,874
Hondo	1,081	.....	.....	1,081	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico-Texas: Rio Grande	41,129	.....	.....	41,129	1,324	19,615	.....	.....	20,943	.....	20,313	62,195
North Dakota: North Dakota pumping, Williston unit	2,063	.....	53	2,116	3,131	79	.....	540	3,985	.....	1,304	9,039
Oregon: Umatilla	8,010	34	38	8,082	.....	1,088	.....	.....	.....	.....	.....	1,088
Oregon: Klamath	18,465	.....	3,021	21,486	115,074	.....	.....	.....	59,589	120	9,225	184,008
South Dakota: Belle Fourche	15,854	.....	2,232	18,086	18,101	35,615	.....	1,027	161,765	768	195,205	412,481
Washington:												
Okanogan	.....	.....	.....	4,266	.....	4,011	.....	.....	.....	.....	.....	4,011
Yakima—												
Sunnyside unit	120,685	3,923	5,349	129,957	.....	225,800	.....	.....	.....	.....	.....	225,800
Tieton unit	11,251	700	2,880	14,831	[4],650	28,410	.....	.....	23,766	.....	11,165	67,991
Wyoming: Shoshone	25,288	10	166	25,464	5,646	85	.....	.....	84,585	.....	35,039	125,355
Total	941,905	9,858	28,284	984,673	1,151,147	500,513	129,642	8,384	1,602,839	14,854	1,243,378	4,650,787
Total, 1912	543,426	15,037	17,935	576,398	427,486	531,252	75,987	48,352	1,955,525	17,676	1,174,060	4,230,338

Total crop yields, 1913—Continued.

State and project.	Vegetables.				Fruit.						
	Beans.	Onions.	Potatoes, common.	Potatoes, sweet.	Apples.	Citrus.	Peaches.	Pears.	Prunes.	Small.	Total.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Arizona: Salt River	25,976					2,119,500				856,500	9,439,125
Arizona-California: Yuma	395										
California: Orland						503,603			100,000		768,059
Colorado: Uncompahgre	752	39,428	725,055		7,099,950		1,825	3,200	94,500	42,168	7,241,643
Idaho: Boise	1,415	747	113,088	479	739,970		26,000		36,168	25,988	828,126
Idaho:											
Minidoka—											
Gravity unit	513	1,475	210,355		136,681			647	850	25,913	164,091
Pumping unit	718	100	351,468		16,750			800		13,500	31,050
Total	1,231	1,575	561,823		153,431			1,447	850	39,413	195,141
Montana:											
Flathead			4,234		6,500						6,500
Fort Peck											
Huntley	306		11,889								
Milk River			517								
Sun River			18,852								
Montana-North Dakota: Lower Yellowstone			4,617								
Nebraska-Wyoming: North Platte			151,304								
Nevada: Truckee-Carson		10,915	29,789								
New Mexico:											
Carlsbad	6			808	16,200		742,500			2,375	761,075
Hondo					66,500		3,333			1,250	71,083
New Mexico-Texas: Rio Grande	1,248									38,720	572,092
North Dakota: North Dakota pumping, Williston unit	12		5,524								
Oregon: Umatilla		436	7,538		1,800	139,000	62,200			65,281	268,281
Oregon: Klamath			20,863								
South Dakota: Belle Fourche	447		25,704								
Washington:											
Okanogan	159	176	16,100								1,045,500
Yakima—											
Sunnyside unit			1,239,216		26,169,150		7,116,000	4,983,960	1,980,000		40,249,110
Tieton unit	1,192	3,114	734,760		1,481,490		915,835	105,550		83,630	2,586,505
Wyoming: Shoshone	6	36	11,461								
Total	33,145	56,427	3,701,454	1,287	35,734,991	2,762,103	8,867,693	5,094,157	2,211,518	1,155,325	64,032,240
Total, 1912	7,455	202,954	3,553,029								122,553,601

Total crop yields, 1913—Continued.

State and project.	Seed.				Other crops.					
	Alfalfa.	Clover.	Millet.	Total.	Beets, sugar.	Cane.	Corn fodder.	Cotton.	Field peas.	Hops.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Tons.*	*Tons.*	*Tons.*	*Pounds.*	*Bushels.*	*Pounds.*
Arizona: Salt River					12,945	7,313	16,929	1,704,185		
Arizona-California: Yuma	18,985			18,985			1,709	19,610		
California: Orland							69			
Colorado: Uncompahgre	29	15		44	16,971		138		452	
Idaho: Boise	599	15,057	326	15,982	10		314		149	
Idaho:										
Minidoka—										
Gravity unit		141		141	4,607		9		1,110	
Pumping unit	90	170		260	17,395		54		7,763	
Total	90	311		401	22,002		63		8,873	
Montana:										
Flathead			33	33	5		49		43	
Fort Peck										
Huntley					45,511					
Milk River					6					
Sun River	39		45	84	19				100	
Montana-North Dakota: Lower Yellowstone										
Nebraska-Wyoming: North Platte	3,108			3,108	32,739					
Nevada: Truckee-Carson					9,460					
New Mexico:										
Carlsbad	6,864	14	6	6,884		373	551	300,000		
Hondo						95				
New Mexico-Texas: Rio Grande	201			201			30			
North Dakota: North Dakota pumping, Williston unit	3			3						
Oregon: Umatilla							212			
Oregon: Klamath										
South Dakota: Belle Fourche	2,157		315	2,472	47		729			
Washington:										
Okanogan										
Yakima—										
Sunnyside unit										300,952
Tieton unit							729		117	192,390
Wyoming: Shoshone	175	60		235	71	3	5		20	
Total	32,250	15,457	725	48,432	139,786	7,784	21,527	2,023,795	9,754	493,342
Total, 1912	27,886		1,370	29,256	102,635	1,992	1,308	255,800		410,680

Average crop prices, 1913.

State and project.	Hay.				Grain.							
	Alfalfa.	Clover.	Other.	Total.	Barley.	Corn, Indian.	Corn, sorghum.	Flax.	Oats.	Rye.	Wheat.	Total.
	Ton.	*Ton.*	*Ton.*	*Ton.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Arizona: Salt River	$7.00		$9.00	$7.00	$0.65	$0.85			$0.55		$0.80	$0.68
Arizona-California: Yuma	7.53		8.96	7.60	.628	.735	$0.513				.864	.56
California: Orland	10.01			10.01		.96						.96
Colorado: Uncompahgre	7.48	$7.36	6.27	7.46	.37	1.00			.43	$1.39	.79	.57
Idaho:												
Boise	5.50	7.00	7.00	5.58	.50	.70			.30	.60	.66	.52
Minidoka—												
Gravity unit	5.50	5.50	6.25	5.52	.48	.75		$1.36	.36	.566	.60	.45
Pumping unit	5.50	5.50	6.25	5.50	.43	.75			.38	.60	.60	.49
Montana:												
Flathead	10.00	10.00	12.00	10.80	.56	.60		1.12	.30		.65	.36
Fort Peck				4.50				1.00				.74
Huntley	5.50		11.85	5.72	.48	1.05		1.20	.32		.66	.40
Milk River	10.00		10.95	10.55	.36			1.24	.40		.65	.60
Sun River	6.00		10.20	6.48	.70			1.10	.50	.60	.60	.54
Montana-North Dakota:												
Lower Yellowstone	9.74		9.08	9.71	.46			1.19	.26		.70	.53
Nebraska-Wyoming: North Platte	5.00			5.00	.60	.70			.40	.45	.63	.50
Nevada: Truckee-Carson	7.00		7.00	7.00	.60				.40		.85	.67
New Mexico:												
Carlsbad	9.63			9.63		1.11	.81		1.17		1.20	.90
Hondo	11.61			11.61								
New Mexico-Texas: Rio Grande	12.96			12.96	.77	1.10			.60		.98	.89
North Dakota: North Dakota pumping, Williston unit	13.00		10.00	12.82	.40	.55		1.20	.35		.70	.47
Oregon: Umatilla	8.00	7.35	6.00	7.98		.84						.84
Oregon-California: Klamath	8.00		8.45	8.07	.50				.30	.50	.75	.45
South Dakota: Belle Fourche	4.50		10.00	5.12	.60	.80		1.50	.40	.60	.60	.54
Washington:												
Okanogan				10.00		1.00						1.00
Yakima—												
Sunnyside unit	7.00	8.00	10.00	7.15		.70						.70
Tieton unit	7.15	8.15	6.00	6.96	.62	.65			.40		.78	.58
Wyoming: Shoshone	6.50	5.00	6.50	6.50	.80	.50			.50		.80	.60
Average	7.02	7.12	8.50	7.07	.61	.74	.55	1.22	.39	.54	.70	.57
Average, 1912	6.90	8.80	7.80	6.96	.52	.63	.60	1.16	.37	.52	.69	.52

Average crop prices, 1913—Continued.

State and project.	Vegetables.				Fruit.						
	Beans.	Onions.	Potatoes, common.	Potatoes, sweet.	Apples.	Citrus.	Peaches.	Pears.	Prunes.	Small.	Total.
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Arizona: Salt River	$2.40		$0.90			$0.04				$0.0276	$0.025
Arizona-California: Yuma	2.00										
California: Orland						.035			$0.02		.03
olorado: Uncompahgre	2.34	$0.68	.52		$0.018		$0.039	$0.05	.025	.077	.019
Idaho:											
Boise	2.70	.50	.50	$1.92	.015		.0125		.0125	.017	.015
Minidoka—											
Gravity unit	3.00	.84	.36		.02			.025	.025	.05	.025
Pumping unit	3.00	.90	.36		.02			.025		.05	.033
Montana:											
Flathead			.60		.02						.02
Fort Peck											
Huntley	3.00		.45								
Milk River			1.20								
Sun River			.75								
Montana-North Dakota: Lower Yellowstone			.67								
Nebraska-Wyoming: North Platte			.45								
Nevada: Truckee-Carson		.80	.75								
New Mexico:											
Carlsbad	4.20			1.38	.022		.03			.04	.03
Hondo					.0094		.03			.04	.011
New Mexico-Texas: Rio Grande	2.44									.033	.031
North Dakota: North Dakota pumping, Williston unit	3.00		.65								
Oregon: Umatilla		.50	.64		.04	.075	.022			.046	.02
Oregon-California: Klamath			.50								
South Dakota: Belle Fourche	2.00		.60								
Washington:											
Okanogan	3.60	.85	.50								.02
Yakima—											
Sunnyside unit			.45		.024		.013	.025	.027		.022
Tieton unit	2.03	.68	.23		.02		.012	.024		.03	.018
Wyoming: Shoshone	3.00	1.70	.50								
Average	2.42	.70	.42	1.59	.022	.0375	.014	.025	.0267	.031	.022
Average, 1912	2.16	.24	.30	1.54	.014		.015	.025			.015

Average crop prices, 1913—Continued.

State and project.	Seed.				Other crops.					
	Alfalfa.	Clover.	Millet.	Total.	Beets, sugar.	Cane.	Corn fodder.	Cotton.	Field peas.	Hops.
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Ton.*	*Ton.*	*Ton.*	*Lb.*	*Bu.*	*Lb.*
Arizona: Salt River					$5.00	$5.00	$16.00	$0.20		
Arizona-California: Yuma	$6.56			$6.56			3.73	.21		
California: Orland							26.78			
Colorado: Uncompahgre	9.38	$12.00		10.25	5.45		5.63		$1.53	
Idaho:										
Boise	7.20	7.50	$1.50	7.36	8.00		7.00		4.20	
Minidoka—										
Gravity unit		6.60		6.60	4.75		5.75		3.00	
Pumping unit	6.60	6.60		6.60	4.75		5.00		1.80	
Montana:										
Flathead			1.50	1.50	5.00		5.00		2.50	
Fort Peck										
Huntley					6.00					
Milk River					5.00					
Sun River	12.00		1.00	6.11	5.00				.75	
Montana-North Dakota: Lower Yellowstone										
Nebraska-Wyoming: North Platte	8.00			8.00	5.50					
Nevada: Truckee-Carson					6.00					
New Mexico:										
Carlsbad	4.34	5.40	1.50	4.35		7.02	5.44	.13		
Hondo						9.47				
New Mexico-Texas: Rio Grande	10.00			10.00			12.00			
North Dakota: North Dakota pumping, Williston unit	12.00			12.00						
Oregon: Umatilla							3.75			
Oregon-California: Klamath										
South Dakota: Belle Fourche	6.00		1.00	5.36	5.00		4.00			
Washington:										
Okanogan										
Yakima—										
Sunnyside unit										$0.25
Tieton unit							6.15		1.12	.22
Wyoming: Shoshone	12.00	12.00		11.97	5.50	6.00	6.50		3.00	
Average	6.32	7.50	1.25	6.62	5.53	5.16	13.66	.19	1.95	.24
Average, 1912	6.46		3.30		5.46	5.80	11.20	.135	1.80	.18

Average crop values per acre cropped, 1913.

State and project.	Hay.				Grain.							
	Alfalfa.	Clover.	Other.	Total.	Barley.	Corn, Indian.	Corn, sorghum.	Flax.	Oats.	Rye.	Wheat.	Total.
Arizona: Salt River	$28.00	.....	$18.00	$27.75	$19.50	$17.00	.....	.....	$19.25	.....	$22.40	$20.10
Arizona-California: Yuma	27.83	.....	13.52	26.60	19.55	9.55	$19.72	.....	.....	.....	17.32	18.87
California: Orland	30.40	.....	.....	30.40	.....	15.95	.....	.....	.....	.....	.....	15.95
Colorado: Uncompahgre	20.32	$4.14	8.10	19.70	14.65	40.28	.....	.....	12.43	$30.00	17.17	14.93
Idaho:												
Boise	19.31	10.81	8.98	18.30	9.34	14.14	.....	.....	7.31	2.02	10.42	9.77
Minidoka—												
Gravity unit	16.74	15.91	14.04	16.61	14.61	13.96	.....	$2.11	10.83	11.51	13.67	12.17
Pumping unit	16.59	11.85	9.13	16.50	10.61	7.65	.....	.....	10.60	9.00	12.68	11.71
Montana:												
Flathead	17.00	14.00	9.60	11.85	8.96	37.20	.....	8.96	11.40	.....	10.40	10.92
Fort Peck	.....	.....	.....	4.50	.....	.....	.....	8.00	.....	.....	.....	8.50
Huntley	18.97	.....	20.60	19.11	6.37	17.45	.....	7.27	9.24	.....	11.77	10.11
Milk River	18.66	.....	9.32	11.71	3.85	.....	.....	9.95	10.90	.....	7.60	8.30
Sun River	13.70	.....	10.43	12.97	17.98	.....	.....	10.94	14.75	6.00	11.35	13.84
Montana-North Dakota:												
Lower Yellowstone	22.30	.....	9.08	21.10	10.31	.....	.....	12.13	8.10	.....	12.30	11.50
Nebraska: North Platte	11.31	.....	.....	11.31	12.75	13.17	.....	.....	9.45	3.04	9.38	10.48
Nevada: Truckee-Carson	17.27	.....	8.05	15.83	13.80	.....	.....	.....	14.52	.....	16.17	14.86
New Mexico:												
Carlsbad	15.58	.....	.....	15.58	.....	17.66	11.32	.....	18.18	.....	36.00	12.80
Hondo	19.38	.....	.....	19.38	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico-Texas: Rio Grande	27.30	.....	.....	27.30	9.50	7.41	.....	.....	15.57	.....	12.91	10.25
North Dakota: Williston unit	24.40	.....	6.40	22.90	8.90	10.79	.....	21.60	10.65	.....	8.67	10.35
Oregon:												
Umatilla	31.66	12.50	5.43	30.95	.....	16.32	.....	.....	.....	.....	.....	16.32
Klamath	17.63	.....	13.10	16.76	14.52	.....	.....	.....	11.16	7.50	11.80	13.36
South Dakota: Belle Fourche	9.65	.....	8.81	9.44	14.59	15.32	.....	7.03	12.11	6.49	8.94	10.46
Washington:												
Okanogan	.....	.....	.....	.....	.....	21.00	.....	.....	.....	.....	.....	21.00
Yakima—												
Sunnyside unit	35.00	28.00	30.00	34.40	.....	35.00	.....	.....	.....	.....	29.75	34.80
Tieton unit	24.40	17.60	11.60	20.20	21.30	17.10	.....	.....	8.45	.....	25.20	14.72
Wyoming: Shoshone	15.02	1.52	5.38	14.80	14.41	5.67	.....	.....	13.17	.....	11.27	12.45
Average	22.65	16.90	13.20	22.10	16.98	18.42	17.23	10.09	11.07	4.85	13.10	13.90
Average, 1912	21,30	27.00	8.00	.....	14.55	15.80	11.80	13.40	12.00	4.75	13.50	.....

Average crop values per acre cropped, 1913—Continued.

State and project.	Seed.				Vegetables.					
	Alfalfa.	Clover.	Millet.	Total.	Beans.	Onions.	Potatoes, common.	Potatoes, sweet.	Truck.	Total.
Arizona: Salt River	.....	.....	.....	.....	$38.40	.....	$36.00	.....	$77.20	$59.20
Arizona-California: Yuma	$37.33	.....	.....	$37.33	14.63	.....	.....	.....	83.34	71.60
California: Orland	.....	.....	.....	.....	.....	.....	.....	.....	108.50	108.50
Colorado: Uncompahgre	15.11	$9.00	.....	11.90	32.00	$167.95	69.96	.....	50.00	72.10
Idaho:										
Boise	12.54	34.81	$10.14	32.40	32.18	40.60	45.05	$68.29	44.50	44.25
Minidoka—										
Gravity unit	.....	32.10	.....	32.10	57.00	82.47	54.25	.....	48.45	53.50
Pumping unit	24.75	22.44	.....	23.20	32.15	180.00	40.05	.....	50.00	40.80
Montana:										
Flathead	.....	.....	27.00	27.00	.....	.....	51.60	.....	50.00	50.70
Fort Peck	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huntley	.....	.....	.....	.....	23.55	.....	54.04	.....	107.70	86.00
Milk River	.....	.....	.....	.....	.....	.....	155.10	.....	75.00	128.30
Sun River	6.78	.....	15.00	7.12	.....	.....	78.10	.....	100.00	81.50
Montana-North Dakota: Lower Yellowstone	.....	.....	.....	.....	.....	.....	76.02	.....	79.47	77.40
Nebraska: North Platte	8.44	.....	.....	8.44	.....	.....	58.90	.....	29.04	50.70
Nevada: Truckee-Carson	.....	.....	.....	.....	.....	229.78	53.70	.....	109.80	80.20
New Mexico:										
Carlsbad	10.31	25.20	18.00	10.33	12.60	.....	.....	69.92	68.00	67.20
Hondo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Mexico-Texas: Rio Grande	37.22	.....	.....	37.22	6.45	.....	.....	.....	55.20	39.70
North Dakota: Williston unit	14.40	.....	.....	14.40	72.00	192.80	78.94	.....	122.50	97.90
Oregon:										
Umatilla	.....	.....	.....	.....	.....	72.67	58.12	.....	48.05	54.30
Klamath	.....	.....	.....	.....	.....	.....	49.20	.....	60.00	52.30
South Dakota: Belle Fourche	8.21	.....	5.83	8.13	13.34	.....	51.75	.....	21.58	37.30
Washington:										
Okanogan	.....	.....	.....	.....	40.80	75.00	50.00	.....	50.00	49.75
Yakima—										
Sunnyside unit	.....	.....	.....	.....	.....	.....	118.80	.....	100.50	116.50
Tieton unit	.....	.....	.....	.....	10.90	64.00	45.50	.....	33.40	43.20
Wyoming: Shoshone	13.87	48.00	.....	16.95	4.00	122.40	34.16	.....	35.95	34.90
Average	17.77	34.50	8.41	21.50	29.00	152.30	67.20	69.20	67.10	64.60
Average, 1912	20.20	.....	45.70	.....	27.30	65.40	43.50	.....	34.80	.....

Average crop values per acre cropped, 1913—Continued.

State and project.	Fruit.						
	Apples.	Citrus.	Peaches.	Pears.	Prunes.	Small.	Total.
Arizona: Salt River		$120.00				$83.10	$97.90
Arizona-California: Yuma							119.62
California: Orland		248.94			$100.00	252.00	140.00
Colorado: Uncompahgre	$82.59		$0.37	$11.43	103.40	81.00	73.50
Idaho:							
Boise	121.44		8.23		57.96	74.75	85.60
Minidoka—							
Gravity unit	10.94			8.00	5.25	24.00	13.10
Pumping unit	27.92			10.00		135.00	54.20
Montana:							
Flathead	81.20						81.20
Fort Peck							
Huntley							
Milk River							
Sun River							
Montana-North Dakota: Lower Yellowstone							
Nebraska: North Platte							
Nevada: Truckee-Carson							
New Mexico:							
Carlsbad	36.00		127.65			63.32	122.10
Hondo	14.27		3.33			8.33	9.73
New Mexico-Texas: Rio Grande						13.41	41.40
North Dakota: Williston unit							
Oregon:							
Umatilla	6.50	80.15	15.72			22.40	22.40
Klamath							
South Dakota: Belle Fourche							
Washington:							
Okanogan							22.60
Yakima—							
Sunnyside unit	98.30		78.00	209.80	273.00	128.80	108.70
Tieton unit	75.80		64.00	33.90		78.70	68.30
Wyoming: Shoshone							
Average	91.40	130.60	67.70	185.40	233.00	87.20	91.90
Average, 1912							151.00

Average crop values per acre cropped, 1913—Continued.

State and project.	Other crops.							Average.			
	Beets, sugar.	Cane.	Corn fodder.	Cotton.	Field peas.	Hops.	Pasture.	1913	1912	1911	1910
Arizona: Salt River	$42.50	$75.00	$12.00	$75.00	.....	.....	$12.00	$28.17	$30.65	$24.00	$40.00
Arizona-California: Yuma	.....	.....	10.66	66.50	.....	.....	22.61	36.48	44.90	59.00	63.00
California: Orland	.....	.....	19.55	.....	.....	.....	4.35	34.07	30.46	25.00	50.00
Colorado: Uncompahgre	40.88	.....	13.63	.....	$2.88	.....	3.99	32.77	32.28	65.00	42.00
Idaho:											
Boise	40.00	.....	22.89	.....	20.68	.....	9.24	16.32	16.07	16.00	13.00
Minidoka—											
Gravity unit	46.36	.....	10.40	.....	72.39	.....	5.06	16.08	13.10	10.00	.....
Pumping unit	39.31	.....	14.59	.....	30.24	.....	5.00	18.51	15.00	15.00	.....
Montana:											
Flathead	25.00	.....	40.00	.....	20.00	.....	7.50	11.76	15.72	15.00	15.00
Fort Peck	.....	.....	.....	.....	.....	.....	.....	4.78	.....	.....	.....
Huntley	61.02	.....	.....	.....	.....	.....	.....	29.35	27.10	26.00	25.00
Milk River	10.00	.....	.....	.....	.....	.....	.....	9.76	11.02	13.00	.....
Sun River	31.66	.....	.....	.....	15.00	.....	12.00	15.51	12.32	15.00	7.00
Montana-North Dakota: Lower Yellowstone	.....	.....	.....	.....	.....	.....	2.34	13.71	12.58	14.00	17.00
Nebraska: North Platte	61.67	.....	.....	.....	.....	.....	8.00	14.40	11.04	9.00	8.00
Nevada: Truckee-Carson	52.50	.....	.....	.....	.....	.....	1.98	12.92	12.83	16.00	18.00
New Mexico:											
Carlsbad	.....	18.47	13.45	25.83	.....	.....	8.99	21.10	17.97	21.00	30.00
Hondo	.....	11.25	.....	.....	.....	.....	.....	17.62	19.73	14.00	14.00
New Mexico-Texas: Rio Grande	.....	.....	18.00	.....	.....	.....	12.19	25.40	30.70	28.00	37.00
North Dakota: Williston unit	.....	.....	.....	.....	.....	.....	5.95	23.06	16.04	16.00	19.00
Oregon:											
Umatilla	.....	.....	10.45	.....	.....	.....	6.65	27.72	24.00	21.00	25.00
Klamath	.....	.....	.....	.....	.....	.....	8.00	15.22	16.16	18.00	13.00
South Dakota: Belle Fourche	29.37	.....	4.11	.....	.....	.....	6.98	10.91	11.09	9.00	13.00
Washington:											
Okanogan	.....	.....	.....	.....	.....	.....	10.00	31.59	36.60	25.00	46.00
Yakima—											
Sunnyside unit	.....	.....	.....	.....	.....	$473.25	30.00	61.00	71.20	88.00	81.00
Tieton unit	.....	.....	23.00	.....	21.90	177.50	21.00	33.60	28.00	41.00	29.00
Wyoming: Shoshone	42.22	3.00	9.29	.....	40.00	.....	11.41	14.40	10.07	12.00	13.00
Average	52.00	56.10	11.93	62.00	23.75	296.00	7.60	24.50	25.60	27.00	31.00
Average, 1912	50.80	16.90	21.50	26.80	.....	270.00	8.40	.....	.....	.....	.....

Total crop values, 1913.

State and project.	Hay.				Seeds.			
	Alfalfa.	Clover.	Other.	Total.	Alfalfa.	Clover.	Millet.	Total.
Arizona: Salt River	$2,373,392		$38,988	$2,412,380				
Arizona-California: Yuma	287,195		13,309	300,504	$126,450			$126,450
California: Orland	153,477			153,477				
Colorado: Uncompahgre	214,854	$596	3,599	219,049	272	$180		452
Idaho:								
Boise	297,894	14,783	5,057	317,734	4,311	112,927	$489	117,727
Minidoka—								
Gravity unit	291,802	13,651	8,706	314,159		931		931
Pumping	139,640	1,694	356	141,690	594	1,122		1,716
Total	431,442	15,345	9,062	455,849	594	2,053		2,647
Montana:								
Flathead	899	2,079	2,556	5,534			50	50
Fort Peck				1,620				
Huntley	91,987		7,206	99,193				
Milk River	4,011		5,808	9,819				
Sun River	22,242		4,874	27,116	468		45	513
Montana-North Dakota: Lower Yellowstone	31,462		1,362	32,824				
Nebraska: North Platte	308,640			308,640	24,864			24,864
Nevada: Truckee-Carson	319,442		28,007	347,449				
New Mexico:								
Carlsbad	122,997			122,997	29,841	76	9	29,926
Hondo	12,558			12,558				
New Mexico-Texas: Rio Grande	533,148			533,148	2,010			2,010
North Dakota:								
North Dakota pumping—								
Williston unit	26,617		530	27,147	36			36
Buford-Trenton unit								
Oregon:								
Umatilla	64,080	250	228	64,558				
Klamath	147,720		25,516	173,236				
South Dakota: Belle Fourche	71,343		22,320	93,663	12,942		315	13,257
Washington:								
Okanogan				42,660				
Yakima—								
Sunnyside unit	844,795	31,384	53,490	929,669				
Tieton unit	80,110	5,718	17,313	103,141				
Wyoming: Shoshone	164,372	50	1,079	165,501	2,094	720		2,814
Total	6,604,677	70,205	240,304	6,959,466	203,882	115,956	908	320,746
Per cent	42.0	0.4	1.5	44.2	1.3	0.7	0	2.0
Total, 1912	3,735,235	132,816	140,227	4,008,278	180,037			
Per cent	27.0	1.0	1.0	29.0	1.3			

Total crop values, 1913—Continued.

State and project.	Grain.							
	Barley.	Corn, Indian.	Corn, sorghum.	Flax.	Oats.	Rye.	Wheat.	Total.
Arizona: Salt River	$486,442	$32,105			$46,190		$212,632	$777,369
Arizona-California: Yuma	23,475	2,759	$57,740				6,656	90,630
California: Orland		327						327
Colorado: Uncompahgre	1,421	4,672			59,643	$421	67,504	133,661
Idaho:								
Boise	21,635	40,473			50,239	637	125,514	238,498
Minidoka—								
Gravity unit	9,671	2,946		$19	60,739	3,314	52,624	129,313
Pumping	10,025	398			51,456	63	86,517	148,459
Total	19,696	3,344		19	112,195	3,377	139,141	277,772
Montana:								
Flathead	1,094	94		27	28,779		12,659	42,653
Fort Peck				160				340
Huntley	1,217	5,689		647	36,405		14,412	58,370
Milk River	135			1,772	2,834		8,646	13,387
Sun River	4,316			1,959	38,397	60	10,702	55,434
Montana-North Dakota: Lower Yellowstone	10,589			3,420	9,400		38,581	61,990
Nebraska: North Platte	29,713	46,901			84,640	2,823	20,468	184,545
Nevada: Truckee-Carson	25,942				4,110		25,730	55,782
New Mexico:								
Carlsbad		4,912	13,954		1,637		36	20,539
Hondo								
New Mexico-Texas: Rio Grande	1,024	21,662			12,566		19,872	55,124
North Dakota:								
North Dakota pumping—								
Williston unit	1,252	43		648	1,395		913	4,251
Buford-Trenton unit								
Oregon:								
Umatilla		914						914
Klamath	57,537				17,877	60	6,919	82,393
South Dakota: Belle Fourche	10,861	28,492		1,540	64,706	461	117,123	223,183
Washington:								
Okanogan		4,011						4,011
Yakima—								
Sunnyside unit		158,060					4,196	162,256
Tieton unit	2,897	18,582			9,563		8,677	39,719
Wyoming: Shoshone	4,517	43			42,293		28,031	74,884
Total	703,763	373,083	71,694	10,192	622,869	7,839	868,412	2,658,032
Per cent	4.5	2.4	0.5	0.1	4.0	0	5.5	16.9
Total, 1912	222,680	335,481	47,390	56,165	716,525	9,163	806,894	2,194,298
Per cent	1.6	2.4	0.3	0.4	5.2	0.1	5.8	15.9

Total crop values, 1913—Continued.

State and project.	Vegetables.					
	Beans.	Onions.	Potatoes, common.	Potatoes, sweet.	Truck.	Total.
Arizona: Salt River	$62,342		$17,208		$193,195	$272,745
Arizona-California: Yuma	790				22,000	22,790
California: Orland					7,651	7,651
Colorado: Uncompahgre	1,762	$26,872	374,633		4,030	407,297
Idaho:						
Boise	3,820	373	56,544	$922	20,611	82,270
Minidoka—						
Gravity unit	1,539	1,237	75,728		14,437	92,941
Pumping	2,154	90	126,529		15,350	144,123
Total	3,693	1,327	202,257		29,787	237,064
Montana:						
Flathead			2,540		1,768	4,308
Fort Peck						
Huntley	918		5,350		27,800	34,068
Milk River			620		150	770
Sun River			14,139		3,200	17,339
Montana-North Dakota: Lower Yellowstone			3,117		2,225	5,342
Nebraska: North Platte			68,087		5,712	73,799
Nevada: Truckee-Carson		8,732	22,342		19,779	50,853
New Mexico:						
Carlsbad	25			1,119	2,150	3,294
Hondo						
New Mexico-Texas: Rio Grande	3,045				55,166	58,211
North Dakota:						
North Dakota pumping—						
Williston unit	36	530	3,590		3,185	7,341
Buford-Trenton unit						
Oregon:						
Umatilla		218	4,824		2,835	7,877
Klamath			10,432		5,200	15,632
South Dakota: Belle Fourche	894		15,422		3,820	20,136
Washington:						
Okanogan	571	150	8,050		7,000	15,771
Yakima—						
Sunnyside unit			557,647		66,028	623,675
Tieton unit	2,427	2,110	168,158		6,181	178,876
Wyoming: Shoshone	18	61	5,731		8,600	14,410
Total	80,341	40,373	1,540,691	2,041	498,073	2,161,519
Per cent	0.5	0.3	9.8	0	3.2	13.8
Total, 1912	16,141	48,389	1,061,250		152,136	1,277,916
Per cent	0.1	0.3	7.7	0	1.1	9.2

Total crop values, 1913—Continued.

State and project.	Fruit.						
	Apples.	Citrus.	Peaches.	Pears.	Prunes.	Small.	Total.
Arizona: Salt River		$84,780				$23,693	$237,735
Arizona-California: Yuma							5,623
California: Orland		17,550			$2,000	2,770	23,982
Colorado: Uncompahgre	$128,927		$72	$160	2,378	3,240	134,777
Idaho:							
Boise	11,100		325		452	456	12,333
Minidoka—							
Gravity unit	2,734			16	21	1,296	4,067
Pumping	335			20		675	1,030
Total	3,069			36	21	1,971	5,097
Montana:							
Flathead	130						130
Fort Peck							
Huntley							
Milk River							
Sun River							
Montana-North Dakota: Lower Yellowstone							
Nebraska: North Platte							
Nevada: Truckee-Carson							
New Mexico:							
Carlsbad	360		22,275			95	22,730
Hondo	628		100			50	778
New Mexico-Texas: Rio Grande						1,262	17,525
North Dakota:							
North Dakota pumping—							
Williston unit							
Buford-Trenton unit							
Oregon:							
Umatilla	72	1,042	1,368			2,985	5,467
Klamath							
South Dakota: Belle Fourche							
Washington:							
Okanogan							20,910
Yakima—							
Sunnyside unit	618,171		92,508	124,599	54,067	59,401	948,746
Tieton unit	29,849		10,730	2,542		2,598	45,719
Wyoming: Shoshone							
Total	792,306	103,372	127,378	127,337	58,918	98,521	1,481,552
Per cent	5.0	0.7	0.8	0.8	0.4	0.6	9.4
Total, 1912							1,900,800
Per cent							13.8

Total crop values, 1913—Continued.

State and project.	Other crops.								
	Beets, sugar.	Cane.	Corn fodder.	Cotton.	Hops.	Pasture.	Field peas.	Miscellaneous.	Total other crops.
Arizona: Salt River	$64,727	$36,563	$270,864	$340,837	.....	$139,659	.....	.....	$852,650
Arizona-California: Yuma	.....	.....	6,380	4,123	.....	22,765	.....	$30,963	64,231
California: Orland	.....	.....	1,848	.....	.....	15,037	.....	1,627	18,512
Colorado: Uncompahgre	92,471	.....	777	.....	.....	3,790	$694	2,185	99,917
Idaho:									
Boise	80	.....	2,197	.....	.....	27,493	625	4,036	34,431
Minidoka—									
Gravity unit	21,883	.....	52	.....	.....	23,328	3,330	3,101	51,694
Pumping	82,626	.....	270	.....	.....	9,460	13,973	.....	106,329
Total	104,509	.....	322	.....	.....	32,788	17,303	3,101	158,023
Montana:									
Flathead	25	.....	245	.....	.....	793	108	.....	1,171
Fort Peck	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huntley	273,066	.....	.....	.....	.....	.....	.....	.....	273,066
Milk River	30	.....	.....	.....	.....	.....	.....	.....	30
Sun River	95	.....	.....	.....	.....	4,992	75	.....	5,162
Montana-North Dakota:									
Lower Yellowstone	.....	.....	.....	.....	.....	227	.....	1,204	1,431
Nebraska: North Platte	180,065	.....	.....	.....	.....	9,600	.....	5,108	194,773
Nevada: Truckee-Carson	58,760	.....	.....	.....	.....	36,457	.....	7,707	100,924
New Mexico:									
Carlsbad	.....	2,623	3,000	39,000	.....	5,231	.....	7,935	57,789
Hondo	.....	900	.....	.....	.....	.....	.....	.....	900
New Mexico-Texas: Rio Grande	.....	.....	360	.....	.....	1,780	.....	11,113	13,251
North Dakota:									
North Dakota pumping—									
Williston unit	.....	.....	.....	.....	.....	113	.....	.....	113
Buford - Trenton unit	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oregon:									
Umatilla	.....	.....	795	.....	.....	3,297	.....	1,170	5,262
Klamath	.....	.....	.....	.....	.....	16,928	.....	.....	16,928
South Dakota: Belle Fourche	235	.....	2,916	.....	.....	1,990	.....	.....	5,141
Washington:									
Okanogan	.....	.....	.....	.....	.....	470	.....	2,616	3,086
Yakima—									
Sunnyside unit	.....	.....	.....	.....	$75,238	69,660	.....	11,542	156,440
Tieton unit	.....	.....	4,475	.....	42,273	8,616	131	.....	55,495
Wyoming: Shoshone	391	18	33	.....	.....	4,355	60	.....	4,857
Total	772,454	40,104	294,212	383,960	117,511	406,041	18,996	90,307	2,123,583
Per cent	4.9	0.3	1.9	2.4	0.7	2.6	0.1	0.6	13.5
Total, 1912	561,254	11,587	11,093	34,160	.....	293,189	.....	.....	.....
Per cent	4.1	0.1	0.1	0.2	.....	2.1	.....	.....	.....

Total crop values, 1913—Continued.

State and project.	Total value, all crops.			
	1913	1912	1911	1910
Arizona: Salt River	$4,552,879	$3,955,770	$2,775,000	$4,240,000
Arizona-California: Yuma	610,228	497,013	444,684	545,000
California: Orland	203,949	112,925	60,220	35,000
Colorado: Uncompahgre	995,153	885,330	1,360,910	1,020,000
Idaho:				
Boise	[1] 830,314	571,770	375,238	400,000
Minidoka—				
Gravity unit	593,105	464,036	333,214	
Pumping	543,347	368,718	307,781	
Total	1,136,452	832,754	640,995	465,048
Montana:				
Flathead	53,846	64,846	34,783	30,000
Fort Peck	1,960			
Huntley	464,697	360,071	316,758	200,000
Milk River	24,004	3,631	26,067	
Sun River	105,564	84,092	102,816	30,000
Montana-North Dakota: Lower Yellowstone	101,587	48,011	178,067	129,825
Nebraska: North Platte	786,621	521,455	388,226	346,302
Nevada: Truckee-Carson	555,007	469,882	470,827	310,000
New Mexico:				
Carlsbad	257,274	209,000	257,754	220,162
Hondo	14,236	22,991	15,872	18,200
New Mexico-Texas: Rio Grande	679,271	710,674	721,550	841,190
North Dakota:				
North Dakota pumping—				
Williston unit	38,888	5,181	35,000	21,023
Buford-Trenton unit			16,236	3,395
Oregon:				
Umatilla	84,078	77,219	58,795	46,390
Klamath	288,189	385,065	338,212	318,160
South Dakota: Belle Fourche	355,380	308,602	161,955	171,051
Washington:				
Okanogan	86,438	120,000	59,871	83,673
Yakima—				
Sunnyside unit	2,820,786	3,158,857	3,537,258	3,326,220
Tieton unit	422,950	272,070	206,519	49,000
Wyoming: Shoshone	262,464	148,160	124,975	125,000
Total	15,732,215	13,825,369	12,708,588	12,974,639
Percent	100.0			
Total, 1912	13,825,369			
Percent	100.0			

[1] Includes $27,320, the estimated value of crops grown on 79 farms of 1,918 irrigated acres from which crop data not available.

Inventory of stock and equipment on project farms at close of 1913.[1]

State and project.	Horses.			Mules.			Cattle.		
	Number.	Value.		Number.	Value.		Number.	Value.	
		Each.	Total.		Each.	Total.		Each.	Total.
Arizona: Salt River	12,184	$96	$1,175,175	1,106	$142	$157,095	40,451	$56	$2,262,086
Arizona-California: Yuma	2,111	105	221,525	560	150	84,329	3,900	58	224,251
California: Orland	[5] 713	103	73,778	.....	.....	.....	2,069	.....	108,128
Colorado: Uncompahgre Valley	3,433	102	349,255	156	126	19,580	4,419	39	173,959
Idaho:									
Boise	4,232	98	413,417	222	104	23,000	4,008	52	208,442
Minidoka—									
Gravity unit	3,184	116	368,050	136	88	11,957	3,521	50	176,632
Pumping unit	1,894	106	200,080	14	89	1,250	1,463	53	76,918
Montana:									
Flathead	637	108	68,945	12	147	1,760	432	49	21,385
Huntley	1,656	122	201,287	57	150	8,550	1,844	49	89,784
Milk River	355	128	45,400	2	200	400	419	51	22,975
Sun River	443	117	51,830	9	156	1,400	497	65	32,130
Montana-North Dakota: Lower Yellowstone	1,169	132	154,880	19	108	2,050	1,152	44	50,435
Nebraska-Wyoming: North Platte[2]	[5] 3,785	75	283,875	.....	.....	.....	2,966	45	133,470
Nevada: Truckee-Carson	2,907	89	260,152	347	109	37,800	4,607	46	211,957
New Mexico:									
Carlsbad	595	105	62,550	139	115	15,995	462	26	12,110
Hondo	199	56	11,075	25	98	2,450	316	30	9,620
New Mexico-Texas: Rio Grande	2,049	76	156,067	291	123	35,839	1,956	51	99,139
North Dakota: North Dakota pumping, Williston unit	274	119	32,704	.....	.....	.....	335	47	15,656
Oregon:									
Umatilla	545	86	46,667	20	175	3,500	634	63	39,922
Klamath	1,621	96	155,780	79	106	8,395	2,819	42	118,713
South Dakota: Belle Fourche	2,490	90	224,891	89	84	7,445	2,758	46	127,214
Washington:									
Okanogan	587	100	58,700	12	125	1,500	382	75	28,650
Yakima—									
Sunnyside unit	6,737	92	621,970	137	127	17,375	7,438	64	479,593
Tieton unit	1,139	107	122,075	28	101	2,840	777	69	53,647
Wyoming: Shoshone	1,225	112	137,435	41	123	5,035	1,513	54	81,995
Total and average	56,164	98	5,497,563	3,501	128	449,545	91,138	53	4,858,811

Inventory of stock and equipment on project farms at close of 1913 [1]—Continued.

State and project.	Sheep.			Hogs.			Fowls.		
	Number.	Value.		Number.	Value.		Number.	Value.	
		Each.	Total.		Each.	Total.		Each.	Total.
Arizona: Salt River	6,419	$4.01	$25,721	18,807	$5.87	$110,365	169,240	$0.50	$84,620
Arizona-California: Yuma				2,886	10.00	24,965	27,882	.62	17,180
California: Orland	76	3.92	298	1,447	7.72	11,171	12,209	.68	8,351
Colorado: Uncompahgre Valley	2,375	4.49	10,543	3,548	7.73	27,425	38,124	.49	18,551
Idaho:									
Boise	3,099	5.15	15,960	17,032	6.82	116,083	61,682	.53	32,505
Minidoka—									
Gravity unit	19,363	4.33	83,795	8,237	6.75	55,598	42,028	.42	17,814
Pumping unit	602	4.61	2,773	8,550	6.96	59,534	20,427	.38	7,871
Montana:									
Flathead				1,968	8.24	16,205	7,744	.61	4,702
Huntley	2,784	4.00	11,136	2,023	9.14	18,490	19,608	.53	10,392
Milk River	2	5.00	10	283	15.94	4,512	2,354	.56	1,330
Sun River	[8] 4	5.00	20	1,492	13.50	19,640	8,239	.50	4,119
Montana-North Dakota: Lower Yellowstone	1,600	3.00	4,800	1,353	13.50	18,217	9,638	.53	5,071
Nebraska-Wyoming: North Platte [9]	5,000	3.00	15,000	14,286	8.00	114,288	37,620	.40	15,048
Nevada: Truckee-Carson	280	4.87	1,366	2,608	7.16	18,680	22,286	.90	20,633
New Mexico:									
Carlsbad	96	3.10	298	589	9.76	5,751	8,755	.52	4,603
Hondo				307	9.44	2,899	1,281	.52	660
New Mexico-Texas: Rio Grande	30	5.50	165	3,811	8.20	31,250	[10] 39,661	1.23	48,763
North Dakota: North Dakota pumping, Williston unit	3	5.00	15	425	13.41	5,701	3,426	.50	1,698
Oregon:									
Umatilla	44	5.14	226	1,276	8.69	11,090	10,426	.54	5,596
Klamath	258	4.00	1,048	3,701	5.90	21,811	13,452	.42	5,745
South Dakota: Belle Fourche	12,872	3.76	48,471	4,636	8.75	40,576	23,125	.46	10,586
Washington:									
Okanogan				335	10.00	3,350	6,500	.40	2,600
Yakima—									
Sunnyside unit	4,406	3.67	16,155	16,145	8.74	141,041	107,960	.56	60,468
Tieton unit	107	4.75	511	2,963	8.00	23,655	15,125	.54	8,182
Wyoming: Shoshone	4,133	3.21	13,255	2,221	7.80	17,325	24,449	.47	11,445
Total and average	63,553	3.96	251,566	120,929	7.60	919,622	733,236	.56	408,533

Inventory of stock and equipment on project farms at close of 1913 [1]—Continued.

State and project.	Bees (hives).			Total stock value.	Value of equipment.	Total stock and equipment.	Increase in value over 1912.		
	Number.	Value.					Stock.	Equipment.	Total.
		Each.	Total.						
Arizona: Salt River	10,430	$5.00	$52,750	[2] $4,406,662	$640,377	$5,047,039	(3)	(3)	(3)
Arizona-California: Yuma	2,656	4.00	10,832	[4] 609,692	145,521	755,213	$239,763	$67,780	$307,543
California: Orland	123	5.00	615	202,341	54,630	256,971	74,377	21,895	96,272
Colorado: Uncompahgre Valley	1,362	4.67	6,341	605,654	193,105	792,759	144,890	53,105	197,995
Idaho:									
Boise	1,288	2.93	3,770	813,177	290,093	1,103,270	269,514	68,642	338,156
Minidoka—									
Gravity unit	899	5.57	5,006	[6] 719,152	184,303	903,455	185,981	[7] 17,435	168,546
Pumping unit	172	4.73	815	349,241	134,470	483,711	109,831	[7] 3,023	106,808
Montana:									
Flathead	14	5.00	70	113,067	46,615	159,682	66,179	14,483	80,662
Huntley	58	4.30	249	339,888	99,788	439,676	92,367	3,497	95,864
Milk River	.....	.....	.....	74,627	29,790	104,417	26,168	5,109	31,277
Sun River	5	5.00	25	109,165	23,314	132,479	24,035	4,178	28,213
Montana-North Dakota: Lower Yellowstone	.....	.....	.....	235,453	84,826	320,279	48,405	4,915	53,320
Nebraska-Wyoming: North Platte [9]	315	3.00	945	562,626	250,000	812,626	158,510	50,000	208,510
Nevada: Truckee-Carson	1,918	4.71	9,040	559,628	167,522	727,150	41,262	[7] 23,745	17,517
New Mexico:									
Carlsbad	1,133	4.78	5,425	106,731	27,130	133,861	26,385	10,701	37,086
Hondo	.....	.....	.....	26,704	3,875	30,579	5,934	295	6,229
New Mexico-Texas: Rio Grande	1,863	4.83	8,997	[11] 401,350	165,885	567,235	(3)	(3)	(3)
North Dakota: North Dakota pumping, Williston unit	.....	.....	.....	55,774	19,921	75,695	14,020	3,444	17,464
Oregon:									
Umatilla	329	4.06	1,375	108,376	48,125	156,501	30,956	3,875	34,831
Klamath	200	4.45	992	312,484	73,041	385,525	[7] 83,162	[7] 77,667	[7] 100,829
South Dakota: Belle Fourche	139	5.76	801	459,984	118,243	578,227	139,345	895	140,240
Washington:									
Okanogan	265	4.00	1,060	95,860	70,000	165,860	28,375	[7] 20,000	8,375
Yakima—									
Sunnyside unit	2,695	3.70	9,916	1,346,518	363,441	1,709,959	376,353	[7] 136,559	239,794
Tieton unit	291	2.90	843	211,753	76,943	288,696	(3)	(3)	(3)
Wyoming: Shoshone	710	4.78	3,397	269,886	77,546	347,432	66,875	26,819	93,694
Total and average	26,865	4.57	122,664	13,095,793	3,388,504	16,484,297	2,086,363	121,204	2,207,567

[1] Taken at close of irrigation season; for Salt River project at end of agricultural year, Sept. 30.
[2] Includes 4,119 ostriches, valued at an average of $131 each, or a total of $539,450.
[3] No census in 1912.
[4] Includes 184 ostriches, valued at an average of $145 each, or a total of $25,610.
[5] Includes mules.
[6] Includes 2 elk, valued at $150 each.
[7] Decrease.
[8] Goats.
[9] Figures estimated to exclude approximately 700 horses and 3,000 range cattle wintered on the project, and 57,000 sheep being fattened for market.
[10] Including approximately 15,000 turkeys and ducks.
[11] Includes 125 ostriches, valued at an average of $152 each, or a total of $19,000; and 426 burros, at $5 each, or a total of $2,130.

Water storage, 1913.[1]

(Reservoirs built by Reclamation Service and operated during 1913.)

State and project.	Reservoir.	Capacity. in 1913.	Storage at beginning of year.	Entering reservoir during year.[1]			Water leaving reservoir during year[1]—Outflow.[2]	
				Inflow.[2]	Rain on reservoir.	Total.	Irrigation use.	Wasted.
		Acre-feet.	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*
Arizona: Salt River[1]	Roosevelt	[3] 1,367,300	429,490	545,880	6,867	552,747	739,405	0
California: Orland	East Park	45,500	488	31,952	635	32,587	14,153	240
Idaho:								
Boise	Deer Flat	177,640	25,648	263,028	6,604	269,632	176,524	0
Minidoka	Lake Walcott	150,000	112,200	8,331,746	10,515	8,342,261	554,596	7,787,952
	Jackson Lake	380,000	[4] —7,000			1,425,750		
Montana:								
Flathead[5]	Ninepipe	[6] 5,000	4,476	1,138	1,276	2,414	[7] 2,505	0
Milk River	Point of Rocks	830	0	3,455	86	3,541	2,860	280
Sun River	Willow Creek[8]	[9] 16,700	5,400					
Nebraska-Wyoming:								
North Platte	Pathfinder	1,070,000	4,150	1,203,046	3,411	1,206,457	830,745	44,652
	Lake Alice	11,400	1,816	64,170	1,340	65,514	39,330	4,085
New Mexico:								
Carlsbad	Lake McMillan	70,000	0	291,270	11,100	302,370	0	100,300
	Avalon	7,000	0	219,160	4,865	224,025	86,560	124,300
Hondo	Hondo	40,000	0	1,760		1,760	0	0
Oregon: Umatilla	Cold Springs	50,000	30,575	54,791	913	55,704	46,775	0
South Dakota: Belle Fourche	Belle Fourche	203,770	93,580	118,743	[10] 34,100	152,843	89,575	0
Washington:								
Okanogan	Salmon Lake[1]	2,600	300					
	Conconully	13,000	3,250	20,603	597	21,200	18,997	[12] 456
Yakima	Bumping Lake	34,000	943	234,995	2,172	237,167	236,630	
	Lake Kachess	210,000	38,330	220,772	7,318	228,090	218,970	
	Lake Keechelus	[13] 15,000	14,415	241,371	6,754	248,125	251,040	
	Lake Clealum	[13] 22,800	24,980	721,706	6,514	728,220	746,700	
Wyoming: Shoshone	Shoshone	456,000	51,350			1,296,831	[14] 72,957	[14] 808,474
Total		4,348,640	833,391	12,569,590	105,067	15,397,238	4,128,322	8,870,739

State and project.	Reservoir.	Water leaving reservoir during year [1]—Losses.					Net change during year.[1]		Storage at end of year
		Evaporation.[2]	Seepage.[2]			Total.	Increase.	Decrease.	
			Total.	Mean area submerged.	Per acre.				
		Acre-feet.	*Acre-feet.*	*Acres.*	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*
Arizona: Salt River[1]	Roosevelt	59,659	.....	.....	.....	799,064	.....	246,317	182,173
California: Orland	East Park	2,382	.....	.....	.....	16,775	15,812	.....	16,300
Idaho:									
Boise	Deer Flat	13,773	75,716	5,250	14.42	266,013	3,619	.....	29,267
Minidoka	Lake Walcott	48,278	.....	.....	.....	8,390,826	.....	48,565	63,635
	Jackson Lake	.....	.....	.....	.....	1,427,750	.....	2,000	[4]—9,000
Montana:									
Flathead [5]	Ninepipe	.....	2,053	705	2.91	4,558	.....	2,144	2,332
Milk River	Point of Rocks	.....	401	99	4.05	3,541	.....	.....	0
Sun River	Willow Creek [8]	.....	.....	.....	.....	.....	6,300	.....	11,700
Nebraska-Wyoming:									
North Platte	Pathfinder	47,490	.....	.....	.....	922,887	283,570	.....	287,720
	Lake Alice	2,119	15,350	545	28.17	60,884	4,630	.....	6,446
New Mexico:									
Carlsbad	Lake McMillan	40,720	127,350	5,237	24.33	268,370	34,000	.....	34,000
	Avalon	5,310	855	708	1.27	217,025	7,000	.....	7,000
Hondo	Hondo	.....	1,760	.....	.....	1,760	.....	.....	0
Oregon: Umatilla	Cold Springs	6,330	2,949	1,229	2.40	56,054	.....	350	30,225
South Dakota: Belle Fourche	Belle Fourche	19,220	49,178	5,260	9.35	157,973	.....	5,130	88,450
Washington:									
Okanogan	Salmon Lake [11]	.....	.....	.....	.....	.....	.....	120	180
	Conconully	.....	847	.....	.....	20,300	900	.....	4,150
Yakima	Bumping Lake	.....	.....	.....	.....	236,630	537	.....	1,480
	Lake Kachess	.....	.....	.....	.....	218,970	9,120	.....	47,450
	Lake Keechelus	.....	.....	.....	.....	251,040	.....	2,915	11,500
	Lake Clealum	.....	.....	.....	.....	746,700	.....	18,480	6,500
Wyoming: Shoshone	Shoshone	.....	.....	.....	.....	881,431	415,400	.....	466,750
Total		245,281	276,459	19,033	14.52	14,948,551	454,867	.....	1,288,258

[1] Data are for calendar year, except on Salt River project data are for corresponding agricultural year ending Sept. 30, 1913.
[2] Where seepage and evaporation losses are not given, these are unknown and are involved in the figures for inflow and outflow.
[3] Increased from 1,284,000 during the year by raising spillways 5 feet.
[4] Elevation 6,733.4 assumed as zero of storage because channel obstructions below dam permit only normal flow to pass when water is below that level.
[5] North, Middle, and South Pablo Reservoirs also operated in 1913; data incomplete.
[6] Capacity of 15,100 planned on completion.
[7] Including 102 for stock water.
[8] Not operated for irrigation in 1913; data incomplete.
[9] Capacity of 86,000 planned.
[10] Includes run-off from 170 square miles that enters reservoir directly.
[11] Empties into Conconully Reservoir; data incomplete.
[12] For construction purposes.
[13] To be increased.
[14] Outflow measured at Corbett diversion dam 16 miles below the reservoir and inflow computed from outflow and reservoir stage.

Water diversions, 1913.[1]

State and project.	Stream.	Diversion in acre-feet.						
		January.	February.	March.	April.	May.	June.	July.
Arizona: Salt River[1]	Salt River	19,382	42,067	49,317	88,808	99,679	103,438	106,538
Arizona-California: Yuma.	Colorado River	3,208	9,588	11,309	11,781	11,400	13,949	15,862
California: Orland	Stony Creek		174	6,434	7,657	8,901	6,796	6,817
Colorado: Uncompahgre Valley.	Gunnison River[2]					3,726	10,770	27,854
	Uncompahgre River				14,924	25,106	32,857	31,056
Idaho:								
Boise	Boise River	19,711	35,692	38,158	75,623	109,328	121,896	57,766
Minidoka[3]	Snake River				24,612	84,736	83,956	101,635
Montana:								
Flathead	Marsh Creek					131	198	278
	Post Creek						186	
	Jocko River					167	3,015	3,520
	Big Knife Creek						1,029	867
	Mission Creek					18	203	350
	Mud Creek					357	597	821
	North Crow Creek						1,044	2,377
	Middle Crow Creek							254
	South Crow Creek							492
	All					673	6,272	8,959
Fort Peck	All[4]						350	450
Huntley	Yellowstone River					5,469	10,080	18,741
Milk River	Milk River				474	494	836	2,231
Sun River	Sun River					611	6,539	7,476
Montana-North Dakota: Lower Yellowstone.	Yellowstone River						12,910	8,663
Nebraska-Wyoming: North Platte.	North Platte River				6,427	37,154	67,680	62,798
Nevada: Truckee-Carson.[5]	Carson River			15,465	32,592	42,017	28,719	16,507
New Mexico:								
Carlsbad	Pecos River			4,460	12,800	14,000	7,150	16,890
Hondo	Hondo River	211	15		285		640	187
New Mexico-Texas: Rio Grande.	Rio Grande River		9,506	24,563	26,432	33,103	32,411	7,023
North Dakota: North Dakota pumping.	Missouri River						2,261	805
Oregon: Umatilla	Umatilla River	6,675	7,396	8,115	10,175	13,389	10,078	3,314
Oregon-California: Klamath.	Upper Klamath Lake.					8,573	13,253	6,455
South Dakota: Belle Fourche.	Belle Fourche River				14,720	16,335	18,105	13,475
Washington:								
Okanogan	Salmon River	94	100	194	345	2,882	4,023	5,726
Yakima—								
Sunnyside	Yakima River				40,037	54,844	49,874	53,313
Tieton	Tieton River					11,464	11,100	13,938
Wyoming: Shoshone	Shoshone River				1,844	14,281	13,702	15,623
Total		49,281	104,538	158,015	369,536	594,439	658,875	582,248
Per cent		1.3	2.8	4.3	10.0	16.1	17.8	15.7

[1] Data are for calendar year, except on Salt River project data are for agricultural year, October, 1912, to September, 1913.
[2] Discharges at west portal, Gunnison Tunnel.
[3] Figures are for total diversions minus amounts returned to river through waste ditches; except for 1909 and 1910 figures are for total diversions.
[4] Poplar River and Little Porcupine Creek.
[5] No reliable data of diversions from Truckee River.

Water diversions, 1913 [1]—Continued.

State and project.	Stream.	Diversion in acre-feet.					
		August.	September.	October.	November.	December.	Total.
Arizona: Salt River [1]	Salt River	97,262	91,942	[2] 49,824	[3] 47,030	[4] 28,525	823,812
Arizona-California: Yuma	Colorado River	16,141	13,873	8,669	6,035	5,492	127,307
California: Orland	Stony Creek	3,710	.....	.....	.....	.....	40,489
Colorado: Uncompahgre Valley.	Gunnison River [5]	30,559	17,137	5,097	.....	.....	[6] 95,143
	Uncompahgre River	29,986	22,957	12,205	1,583	.....	170,674
Idaho:							
Boise	Boise River	22,289	5,574	4,498	2,435	2,500	495,470
Minidoka [7]	Snake River	105,859	67,655	18,030	2,784	.....	489,267
Montana:							
Flathead	Marsh Creek	251	378	38	.....	.....	1,274
	Post Creek	119	718	.....	.....	.....	1,023
	Jocko River	895	849	.....	.....	.....	8,446
	Big Knife Creek	522	88	.....	.....	.....	2,505
	Mission Creek	87	56	.....	.....	.....	714
	Mud Creek	498	130	28	.....	.....	2,432
	North Crow Creek	1,154	263	.....	.....	.....	4,838
	Middle Crow Creek	320	158	.....	.....	.....	732
	South Crow Creek	329	161	.....	.....	.....	982
	All	4,175	2,801	66	.....	.....	22,946
Fort Peck	All [8]	.....	.....	.....	.....	.....	800
Huntley	Yellowstone River	14,729	5,683	.....	.....	.....	54,702
Milk River	Milk River	652	.....	176	.....	.....	4,863
Sun River	Sun River	5,426	4,576	.....	.....	.....	24,628
Montana-North Dakota: Lower Yellowstone.	Yellowstone River	4,922	2,613	980	.....	.....	30,088
Nebraska-Wyoming: North Platte.	North Platte River	69,450	53,536	.....	.....	.....	297,045
Nevada: Truckee-Carson [9]	Carson River	13,379	12,823	7,741	.....	.....	169,243
New Mexico:							
Carlsbad	Pecos River	15,480	8,750	4,120	2,910	.....	86,560
Hondo	Hondo River	.....	475	375	.....	.....	2,188
New Mexico-Texas: Rio Grande.	Rio Grande River	1,396	1,000	9,176	.....	.....	144,610
North Dakota: North Dakota pumping.	Missouri River	572	.....	.....	.....	.....	3,638
Oregon: Umatilla	Umatilla River	1,387	996	.....	9,301	10,683	81,509
Oregon-California: Klamath	Upper Klamath Lake	7,391	2,333	.....	.....	.....	38,005
South Dakota: Belle Fourche.	Belle Fourche River	12,220	21,790	8,915	16,020	2,695	124,275
Washington:							
Okanogan	Salmon River	6,193	309	206	116	112	20,300
Yakima—							
Sunnyside	Yakima River	54,475	41,314	26,655	.....	.....	320,512
Tieton	Tieton River	14,607	8,400	.....	.....	.....	59,509
Wyoming: Shoshone	Shoshone River	14,673	6,943	2,701	.....	.....	69,767
Total	.....	516,374	376,343	154,337	88,214	50,007	3,702,207
Per cent	.....	13.9	10.2	4.2	2.4	1.3	100.0

[1] Data are for calendar year; except on Salt River project data are for agricultural year, October, 1912, to September, 1913.
[2] October, 1912, commencing agricultural year.
[3] November, 1912.
[4] December, 1912.
[5] Discharges at west portal, Gunnison Tunnel.
[6] Diversion from Gunnison used mainly to augment flow of Uncompahgre from which water is rediverted; not included in total.
[7] Figures are for total diversions minus amounts returned to river through waste ditches; except for 1909 and 1910 figures are for total diversions.
[8] Poplar River and Little Porcupine Creek.
[9] No reliable data of diversions from Truckee River.

Water diversions, 1913 [1]—Continued.

State and project.	Stream.	Acreage irrigated.	Diversion per acre.				
			1913	1912	1911	1910	1909
Arizona: Salt River [1]	Salt River	163,312	5.0	5.9	4.7	.....	.....
Arizona-California: Yuma	Colorado River	19,607	6.49	7.00	7.00	6.29	8.00
California: Orland	Stony Creek	6,617	6.12	8.05	14.72	6.82	.....
Colorado: Uncompahgre Valley.	Gunnison River [2]	([3])	.....	.....	.....	.....	.....
	Uncompahgre River	[4] 30,221	5.65	4.82	5.46	6.24	4.48
Idaho:							
Boise	Boise River	[5] 76,265	6.50	6.00	7.41	6.96	8.31
Minidoka [6]	Snake River	75,957	6.44	6.27	8.39	[6] 11.72	[6] 11.65
Montana:							
Flathead	Jocko River	2,269	3.71	4.72	4.85	.....	.....
	Big Knife Creek	540	4.65	7.50	7.70	.....	.....
	Mission Creek	266	2.68	1.61	2.25	.....	.....
	All	4,631	4.96	5.21	4.62	.....	.....
Fort Peck	All [7]	410	1.95	.....	.....	.....	.....
Huntley	Yellowstone River	15,798	3.46	3.25	4.07	5.38	.....
Milk River	Milk River	2,545	1.91	8.21	5.38	.....	.....
Sun River	Sun River	7,419	3.3	2.9	3.6	7.5	.....
Montana-North Dakota: Lower Yellowstone.	Yellowstone River	7,660	3.93	3.04	3.40	5.91	7.88
Nebraska-Wyoming: North Platte.	North Platte River	[8] 63,166	4.70	4.31	7.42	6.55	5.76
Nevada: Truckee-Carson [9]	Carson River	[10] 40,818	4.15	4.66	8.71	.....	.....
New Mexico:							
Carlsbad	Pecos River	14,260	6.06	6.32	5.74	7.09	7.07
Hondo	Hondo River	932	2.3	10.4	18.5	.....	.....
New Mexico-Texas: Rio Grande.	Rio Grande River	27,723	5.21	5.41	6.94	5.54	8.58
North Dakota: North Dakota pumping.	Missouri River	1,739	1.31	.86	1.22	1.69	1.54
Oregon: Umatilla	Umatilla River	4,994	16.3	19.6	23.4	27.8	33.5
Oregon-California: Klamath.	Upper Klamath Lake	18,928	2.01	1.77	1.91	1.55	2.25
South Dakota: Belle Fourche.	Belle Fourche River	32,881	3.53	4.38	3.14	3.77	2.41
Washington:							
Okanogan	Salmon River	7,700	2.51	2.45	2.55	.....	.....
Yakima—							
Sunnyside	Yakima River	58,300	5.50	5.52	5.68	5.88	.....
Tieton	Tieton River	18,750	3.17	3.18	3.16	4.62	.....
Wyoming: Shoshone	Shoshone River	19,423	3.59	3.03	3.42	3.28	4.02
Total	.....	[11] 720,056	5.14	.....	.....	.....	.....

[1] Data are for calendar year; except on Salt River project data are for agricultural year, October, 1912, to September, 1913.

[2] Discharges at west portal, Gunnison Tunnel.

[3] Diversion from Gunnison used mainly to augment flow of Uncompahgre, from which water is rediverted; not included in total.

[4] Less than total irrigated on project by 1,207 acres irrigated directly from South Canal (Gunnison diversion).

[5] Exceeds figure given in other tables as total irrigated by Government system by 18,000 acres of New York Canal Co.'s lands.

[6] Figures are for total diversions minus amounts returned to river through waste ditches; except for 1909 and 1910 figures are for total diversions.

[7] Poplar River and Little Porcupine Creek.

[8] Exceeds figure given in other tables as total irrigated by Government system by 6,337 acres of North Platte Canal & Colonization Co.'s lands.

[9] No reliable data of diversions from Truckee River.

[10] Less than total irrigated on project by 2,257 acres irrigated directly from Truckee Canal (Truckee diversion).

[11] Exceeds total given in other tables by 20,873 acres as indicated in footnotes 4, 5, 8, and 10.

Water distribution, 1913.[1]

State and project.	Acre-feet delivered to farms.									
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
Arizona: Salt River [1]	9,297	24,583	31,989	59,121	64,829	64,458	61,633	60,176	55,260	[2] 27,463
Arizona-California: Yuma	1,454	5,995	7,486	8,378	8,504	10,418	12,022	10,009	8,947	5,785
California: Orland	.....	17	2,076	2,384	4,417	4,109	4,616	2,233	.....	.....
Colorado: Uncompahgre Valley	.....	.....	.....	.....	27,865	32,817	30,866	30,922	23,532	14,054
Idaho: Boise—										
Upper system [6]	.....	.....	.....	1,356	26,967	38,589	24,616	12,777	1,653	1,695
Lower system [7]	.....	.....	.....	2,019	15,885	16,279	15,779	14,861	7,115	625
Total	.....	.....	.....	3,375	42,852	54,868	40,395	27,638	8,768	2,320
Minidoka—										
Gravity unit	.....	.....	.....	.....	31,585	50,855	54,254	55,032	36,309	7,787
South side pumping unit	.....	.....	.....	.....	7,784	10,862	18,438	17,091	10,039	244
Total	.....	.....	.....	.....	41,108	65,736	76,099	77,136	50,063	8,441
Montana:										
Flathead	.....	.....	.....	.....	37	2,556	2,477	727	217	.....
Fort Peck	.....	.....	.....	.....	.....	350	450	.....	.....	.....
Huntley	.....	.....	.....	.....	1,440	4,059	10,080	6,982	1,557	.....
Milk River	.....	.....	.....	27	226	307	1,426	215	20	129
Sun River	.....	.....	.....	.....	161	3,832	4,240	1,602	1,352	.....
Montana-North Dakota: Lower Yellowstone	.....	.....	.....	.....	.....	5,438	3,549	701	415	147
Nebraska-Wyoming: North Platte	.....	.....	.....	.....	9,527	33,856	33,072	40,595	24,439	.....
Nevada: Truckee-Carson	.....	.....	8,002	22,567	29,691	11,950	11,825	9,035	8,920	4,985
New Mexico: Carlsbad	.....	.....	839	7,013	6,112	2,481	6,324	5,648	2,937	889
Hondo	30	.....	.....	102	.....	356	.....	.....	230	82
NewMexico-Texas:RioGrande	.....	5,315	23,072	23,883	29,534	25,788	6,153	1,396	1,000	4,463
North Dakota: North Dakota pumping	.....	.....	.....	.....	.....	1,312	479	496	.....	.....
Oregon: Umatilla	.....	.....	100	5,450	7,950	8,550	6,550	8,150	5,500	.....
Oregon-California: Klamath	.....	.....	.....	.....	4,990	8,147	4,285	4,040	699	.....
South Dakota: Belle Fourche	.....	.....	.....	.....	554	12,851	22,631	7,668	3,645	.....
Washington: Okanogan	.....	.....	.....	.....	1,539	2,259	3,808	4,277	110	.....
Yakima—										
Sunnyside unit	.....	.....	.....	18,677	35,059	31,284	37,276	38,431	28,123	16,090
Tieton unit	.....	.....	.....	.....	7,670	8,316	11,024	10,435	5,094	.....
Wyoming, Shoshone	.....	.....	.....	263	7,685	7,949	10,162	9,323	3,682	1,373
Total	10,781	35,910	73,564	151,240	331,750	404,047	401,442	357,835	234,510	86,221

[1] Data are for calendar year except on Salt River project data are for corresponding agricultural year, October, 1912, to September, 1913.
[2] October, 1912, commencing agricultural year.
[3] November, 1912.
[4] December, 1912.
[5] Exceeds figures given in other tables by 5,367 acres mainly in towns.
[6] Above Deer Flat reservoir.
[7] From Deer Flat reservoir.
[8] Exceeds figures given in other tables by 18,000 acres of New York Canal Co. lands.
[9] Delivered to sublaterals.
[10] At lateral head gates.
[11] Exceeds total given in other tables by 23,367 acres as indicated in footnotes 5 and 8.

Water distribution, 1913.[1]—Continued.

State and project.	Acre-feet delivered to farms.			Acreage irrigated.	Acre-feet delivered to land per acre irrigated.				
	Nov.	Dec.	Total.		1913	1912	1911	1910	1909
Arizona: Salt River[1]	[3] 25,174	[4] 16,005	499,988	[5] 168,679	2.97	3.94	3.53	3.6	4.2
Arizona-California: Yuma	3,078	3,335	85,411	19,607	4.36	4.6	5.43	3.10	4.85
California: Orland			19,852	6,617	3.00	3.97	3.9	3.4	
Colorado: Uncompahgre Valley			160,056	31,428	5.09	4.81	5.44	6.25	4.5
Idaho: Boise—									
Upper system[6]			107,653	50,383	2.13				
Lower system[7]			72,563	25,882	2.85				
Total			180,216	[8] 76,265	2.38	1.93	1.79	1.67	2.39
Minidoka—									
Gravity unit			[9] 235,822	43,873	[9] 5.38				
South side pumping unit			64,458	32,084	2.01				
Total			318,583	75,957	4.19	4.3	5.9	7.3	
Montana:									
Flathead			6,014	4,631	1.30	1.98	1.99	4.53	
Fort Peck			800	410	1.9				
Huntley			24,118	15,798	1.53	1.5	1.88	2.03	2.0
Milk River			2,350	2,545	0.92	0.82	1.28		
Sun River			11,187	7,419	1.51	1.71	1.65	2.3	
Montana-North Dakota: Lower Yellowstone			10,250	7,660	1.34	1.19	1.41	1.44	0.72
Nebraska-Wyoming: North Platte			141,489	56,829	2.49	2.25	4.26	3.93	3.17
Nevada: Truckee-Carson			106,975	43,075	2.48	2.50	4.46	4.65	5.01
New Mexico: Carlsbad	801		33,044	14,260	2.32	2.9	2.2	2.4	2.3
Hondo			800	932	0.86	1.3	0.9	0.9	
New Mexico-Texas: Rio Grande			[10] 120,604	27,723	[10]4.34	[10]5.4	[10]6.0	[10]4.4	[10] 6.6
North Dakota: North Dakota pumping			2,287	1,739	1.31	0.86	1.23	1.63	1.53
Oregon: Umatilla			42,250	4,994	8.45	8.2	9.7	10.2	8.0
Oregon-California: Klamath			22,161	18,928	1.17	1.13	1.23	0.88	1.30
South Dakota: Belle Fourche			47,349	32,881	1.44	1.10	1.64	1.95	1.66
Washington: Okanogan			11,993	7,700	1.57	1.24	1.27	2.46	2.5
Yakima—									
Sunnyside Unit			204,940	58,300	3.51	3.06	3.08	3.29	3.48
Tieton Unit			42,539	18,750	2.27	2.27	1.91	1.73	
Wyoming: Shoshone			40,437	19,423	2.08	1.66	2.20	2.05	2.54
Total	29,053	19,340	2,135,693	[11] 722,550	2.96				

[1] Data are for calendar year except on Salt River project data are for corresponding agricultural year, October, 1912, to September, 1913.
[2] October, 1912, commencing agricultural year.
[3] November, 1912.
[4] December, 1912.
[5] Exceeds figure given in other tables by 5,367 acres mainly in towns.
[6] Above Deer Flat reservoir.
[7] From Deer Flat reservoir.
[8] Exceeds figure given in other tables by 18,000 acres of New York Canal Co. lands.
[9] Delivered to sublaterals.
[10] At lateral headgates.
[11] Exceeds total given in other tables by 23,367 acres as indicated in footnotes 5 and 8.

FINANCES.

RECEIPTS, ALLOTMENTS, AND INVESTMENT, BY STATES.

The table following gives a statement of additions to the reclamation fund from the sale of public lands, by States, and also shows the amounts allotted and the net investment of the Government for irrigation work in each of the reclamation States:

TABLE 1.—*Receipts from the sale of public lands, allotments, and net investment, by States.*

States.	Actual receipts from sale of public lands transferred to credit of reclamation fund to June 30, 1914.	Estimated receipts with Treasury United States on June 30, 1914, not yet audited.	Total estimated receipts to June 30, 1914.	Allotments to June 30, 1914.	Net investment to June 30, 1914.
Arizona	$1,165,696.88	$76,000.00	$1,241,696.88	$17,608,015.62	$15,873,020.83
California	5,358,943.03	262,000.00	5,620,943.03	3,048,167.66	2,424,064.45
Colorado	6,680,991.93	277,000.00	6,957,991.93	9,065,688.75	6,492,806.66
Idaho	5,039,708.90	172,700.00	5,212,408.90	17,956,894.92	14,082,198.37
Kansas	963,080.07	12,000.00	975,080.07	419,000.00	376,029.16
Montana	8,872,107.48	693,000.00	9,565,107.48	11,295,788.40	7,373,177.47
Nebraska	1,664,013.83	95,600.00	1,759,613.83	5,602,377.01	4,319,375.93
Nevada	541,596.96	32,000.00	573,596.96	6,290,476.63	5,414,242.44
New Mexico	3,939,790.95	177,000.00	4,116,790.95	4,694,409.43	2,862,452.76
North Dakota	11,921,898.43	103,500.00	12,025,398.43	2,278,034.14	1,951,020.38
Oklahoma	5,783,557.84	29,800.00	5,813,357.84	172,402.22	72,852.87
Oregon	10,413,928.22	137,000.00	10,550,928.22	5,644,530.82	3,261,623.22
South Dakota	6,823,778.66	175,400.00	6,999,178.66	3,566,534.04	3,142,786.74
Texas				2,083,457.60	1,108,529.93
Utah	1,890,479.34	49,000.00	1,939,479.34	3,459,877.02	2,388,263.70
Washington	6,433,299.73	122,000.00	6,555,299.73	9,131,392.97	6,856,538.59
Wyoming	4,320,900.46	202,000.00	4,522,900.46	7,377,899.38	5,790,562.22
Secondary projects				121,708.12	
Preliminary investigations				511.27	
General accounts				392,790.00	122,512.32
Total	81,813,772.71	2,616,000.00	84,429,772.71	110,209,956.00	83,912,058.04

ALLOTMENTS AND NET INVESTMENT, BY PROJECTS AND BY STATES.

This statement shows the amount of money allotted to each project, the amount of money expended on each project to June 30, 1914, and the amount of money allotted to States and expended in the respective States for the same period:

TABLE 2.—*Statement of project allotments and net investment by States to June 30, 1914.*

State and project.	Per cent chargeable to State.	Allotments to June 30, 1914.	Net investments to June 30, 1914.
Arizona:			
Salt River		$11,173,575.00	$10,096,672.73
Yuma	83	6,280,271.36	5,663,651.24
Colorado River	83	36,279.30	36,279.30
Colorado River Basin	83	41,500.00	27.60
Little Colorado		9,554.33	9,554.33
San Carlos		24,829.51	24,829.51
San Pedro		2,427.34	2,427.34
Preliminary investigation		39,578.78	39,578.78
Total		17,608,015.62	15,873,020.83

TABLE 2.—*Statement of project allotments and net investment by States to June 30, 1914*—Continued.

State and project.	Per cent chargeable to State.	Allotments to June 30, 1914.	Net investments to June 30, 1914.
California:			
Yuma	17	$1,286,320.64	$1,160,024.95
Orland		918,000.00	631,218.81
Klamath	25	748,250.00	551,451.99
Colorado River	17	7,430.70	7,430.70
Colorado River Basin	17	8,500.00	5.65
Iron Canyon		10,000.00	6,766.03
Owens Valley		12,061.92	12,061.92
Pitt River		2,500.00	
Sacramento Valley		43,620.72	43,620.72
San Joaquin		3,531.20	3,531.20
Preliminary investigation		7,952.48	7,952.48
Total		3,048,167.66	2,424,064.45
Colorado:			
Grand Valley		2,716,613.00	1,106,335.60
Uncompahgre		6,341,000.00	5,378,395.31
White River		4,357.00	4,357.00
Preliminary investigation		3,718.75	3,718.75
Total		9,065,688.75	6,492,806.66
Idaho:			
Boise		12,274,649.00	9,399,140.37
Minidoka		5,661,849.00	4,663,311.98
Dubois		17,228.91	17,228.91
Port Neuf		2,168.01	2,168.01
General investigation		1,000.00	349.10
Total		17,956,894.92	14,082,198.37
Kansas: Garden City		419,000.00	376,029.16
Montana:			
Huntley		1,517,406.00	1,017,503.98
Milk River		3,015,983.96	1,821,054 45
Milk River, St. Mary storage		1,441,907.04	809,090.51
Sun River		2,842,828.00	1,449,905.29
Lower Yellowstone	70	2,422,000.00	2,219,359.84
Clark Fork		5,581.23	5,581.23
Crow Reservation		18,911.96	18,911.96
Lake Basin		7,103.26	7,103.26
Madison River		10,729.09	10,729.09
Marias		13,337.86	13,337.86
Total		11,295,788.40	7,373,177.47
Nebraska:			
North Platte	70	5,589,500.00	4,316,258.18
Investigation		10,000.00	240.74
South Platte		2,877.01	2,877.01
Total		5,602,377.01	4,319,375.93
Nevada:			
Truckee-Carson		6,277,973.00	5,401,738.81
Walker River		12,503.63	12,503.63
Total		6,290,476.63	5,414,242.44
New Mexico:			
Carlsbad		1,058,831.00	786,695.20
Hondo		472,110.00	362,352.46
Rio Grande	60	913,140.00	472,402.05
Rio Grande, Elephant Butte storage	60	2,197,046.40	1,187,721.02
La Plata		28,064.33	28,064.33
Las Vegas		5,014.09	5,014.09
Urton Lake		17,464.70	17,464.70
Preliminary investigation		2,738.91	2,738.91
Total		4,694,409.43	2,862,452.76
North Dakota:			
North Dakota, pumping		1,178,000.00	937,832.02
Lower Yellowstone	30	1,038,000.00	951,154.22
Bismarck		13,621.69	13,621.69
Little Missouri		11,933.52	11,933.52

TABLE 2.—*Statement of project allotments and net investment by States to June 30, 1914*—Continued.

State and project.	Per cent chargeable to State.	Allotments to June 30, 1914.	Net investments to June 30, 1914.
North Dakota—Continued.			
Nesson		$17,471.83	$17,471.83
Washburn		10,531.53	10,531.53
Bowman		3,514.54	3,514.54
Preliminary investigation		4,961.03	4,961.03
Total		2,278,034.14	1,951,020.38
Oklahoma:			
Lawton		100,000.00	450.65
Cimarron		12,192.95	12,192.95
Red River		60,209.27	60,209.27
Total		172,402.22	72,852.87
Oregon:			
Umatilla		2,760,000.00	1,458,367.32
Klamath	75	2,244,750.00	1,654,355.98
Central Oregon		40,346.41	40,346.41
Columbia River power		15,000.00	6,131.80
Malheur		83,490.62	83,490.62
Oregon Cooperative		500,000.00	17,987.30
Preliminary investigation		943.79	943.79
Total		5,644,530.82	3,261,623.22
South Dakota:			
Belle Fourche		3,549,716.00	3,125,968.70
Preliminary investigation		16,818.04	16,818.04
Total		3,566,534.04	3,142,786.74
Texas:			
Rio Grande	40	608,760.00	314,934.70
Rio Grande, Elephant Butte	40	1,464,697.60	791,814.01
Pecos River		10,000.00	1,781.22
Total		2,083,457.60	1,108,529.93
Utah:			
Strawberry Valley		3,407,000.00	2,335,386.68
Bear Lake		18,827.72	18,827.72
Utah Lake		34,049.30	34,049.30
Total		3,459,877.02	2,388,263.70
Washington:			
Okanogan		809,250.00	626,186.42
Yakima—			
Storage		1,720,283.00	1,402,447.74
Sunnyside		3,168,604.00	1,809,096.96
Tieton		3,260,870.00	2,858,247.66
Benton		14,000.00	11,136.25
Kittitas		22,000.00	19,366.90
Wapato		40,000.00	36,465.77
Palouse		76,393.01	76,393.01
Palouse Cooperative		10,000.00	7,204.92
Priest Rapids		6,216.01	6,216.01
Preliminary investigation		3,776.95	3,776.95
Total		9,131,392.97	6,856,538.59
Wyoming:			
North Platte	30	2,395,500.00	1,849,824.94
Shoshone		4,973,482.00	3,931,819.90
De Smet		8,917.38	8,917.38
Total		7,377,899.38	5,790,562.22
Secondary projects		121,708.12	
Preliminary investigations		511.27	
General accounts		392,790.00	122,512.32
Total		515,009.39	122,512.32
Grand total		110,200,956.00	83,912,058.04

During the fiscal year 1913 the General Land Office collected from the sale of public lands, not including town-site sales, a total of $4,202,946.67, which resulted in the addition to the fund of $3,737,910.55. The amount added to the fund was 88.935 per cent of the amount collected. During the fiscal year 1914 the gross receipts were approximately $4,010,503.02. Of this amount, $1,801,023.30 has been credited to the reclamation fund, and it is estimated that there is a balance of $1,753,200, which will be available before the end of the calendar year.

Table 2, page 33 of the Tenth Annual Report, gives a statement of the gross proceeds of sales and the corresponding receipts to the reclamation fund for each fiscal year from 1901 to 1910, inclusive; Table 2, page 269 of the Eleventh Annual Report, gives the gross proceeds of sales for the fiscal year 1911; while Table 2, page 297 of the Twelfth Annual Report, gives the proceeds of sales for the fiscal year 1912.

TABLE 3.—*Total receipts from the sale of public lands and resulting additions to the reclamation fund.*

	Total receipts from sale of public lands in reclamation States (not including town-site sales).	Additions to reclamation fund.	
		Amount (not including town-site receipts).	Per cent of total receipts.
1901–1912, inclusive	$84,529,949.31	$77,163,849.39	91.285
1913	4,202,946.67	3,737,910.55	88.935
1914	4,010,503.02	[1] 3,528,012.77	87,969
Total	92,743,399.00	84,429,772.71	91,035

[1] Actual receipts to Dec. 31, 1913, $1,801,023.30; balance of year estimated.

ALLOTMENTS, BY PROJECTS.

When funds become available, annual allotments are made by the Secretary of the Interior, in pursuance of which work is carried on. Table No. 4, below, gives a statement of the allotments from 1902 to June 30, 1914.

TABLE 4.—*Allotments for primary and secondary projects and general expenses to June 30, 1914.*

State and project.	Per cent chargeable to State.	1902–13	Changes during 1914.		Total allotments June 30, 1914.	Analysis of allotments.		
			Reduction.	Addition.		Building fund.	Working fund.	Bond loan.
Arizona: Salt River		$10,349,000		$824,575	$11,173,575	$10,428,575	$250,000	$495.000
Arizona-California: Yuma	83–17	6,724,000		842,592	7,566,592	6,215,592	151.000	1,200,000
California: Orland		638,000		280,000	918,000	888,000	30.000	
Colorado: Grand Valley		1,425,000		1,291,613	2,716,613	1,716,613		1,000,000
Uncompahgre		6,701,000	$360,000		6,341,000	4,841,000		1,500,000
Idaho: Boise		10,407,000		1,867,649	12,274,649	10,274,649		2,000,000
Minidoka		5,357,000		304,849	5,661,849	4,960,849	701,000	
Kansas: Garden City		419,000			419,000	419,000		

TABLE 4.—*Allotments for primary and secondary projects and general expenses to June 30, 1914*—Continued.

State and project.	Per cent chargeable to State.	1902–13.	Changes during 1914.		Total allotments June 30, 1914.	Analysis of allotments.		
			Reduction.	Addition.		Building fund.	Working fund.	Bond loan.
Montana:								
Huntley		$1,360,000		$157,406	$1,517,406	$1,222,406	$295,000	
Milk River		2,991,000		1,466,891	4,457,891	3,457,891		$1,000,000
Sun River		1,997,000		845,828	2,842,828	2,764,828	78,000	
Montana-North Dakota: Lower Yellowstone	70–30	3,460,000			3,460,000	3,030,000	430,000	
Nebraska-Wyoming: North Platte	70–30	8,585,000	600,000		7,985,000	5,535,000	450,000	2,000,000
Nevada: Truckee-Carson		6,206,000		71,973	6,277,973	4,784,973	300,000	1,193,000
New Mexico: Carlsbad		919,000		139,831	1,058,831	958,831	100,000	
Hondo		369,000		103,110	472,110	472,110		
New Mexico-Texas: Rio Grande	60–40	5,258,000	74,356		5,183,644	683,644		4,500,000
North Dakota: North Dakota pumping		1,178,000			1,178,000	978,000	200,000	
Oklahoma: Lawton				100,000	100,000	100,000		
Oregon: Umatilla		1,960,000		800,000	2,760,000	2,325,000	110,000	325,000
Oregon-California: Klamath	75–25	2,993,000			2,993,000	2,333,000	60,000	600,000
South Dakota: Belle Fourche		3,388,000		161,716	3,549,716	3,444,716	105,000	
Utah: Strawberry Valley		3,407,000			3,407,000	1,135,000		2,272,000
Washington: Okanogan		714,000		95,250	809,250	779,250	30,000	
Yakima		7,533,000		616,757	8,149,757	6,134,757	100,000	1,915,000
Wyoming: Shoshone		4,793,000		180,482	4,973,482	4,508,482	465,000	
Secondary projects		818,000		671,000	1,489,000	1,489,000		
Preliminary investigations		81,000			81,000	81,000		
Town-site development		23,000	23,000					
General accounts		392,790			392,790	392,790		
Total		100,445,790	1,057,356	10,821,522	110,209,956	86,354,956	3,855,000	20,000,000

RECONCILING ADMINISTRATIVE ACCOUNTS WITH TREASURY DEPARTMENT BALANCES AND STATEMENTS.

The accounts of the Treasury Department are limited to the movement of cash, either by withdrawal or deposit to the appropriations involved. The administrative accounts of the Reclamation Service, as entered in the tables herein, show the amount, both for receipts and disbursements, upon an accrual basis. The cash account, however, must, if correct, agree with the Treasury Department statement of funds made available by appropriations, reimbursements, expenditures, and withdrawals. Table 5, below, shows a condensed statement of cash collected, appropriated, disbursed, and on hand, and Table 6 gives a reconciliation of the amounts of the appropriations, withdrawals, and balances used in the preparation of these financial tables, with the figures shown by the statements of the Treasury Department.

TABLE 5.—*Reclamation fund account to June 30, 1914.*

Item.		Debit.	Credit.
Balance end of fiscal year 1913, as per Twelfth Annual Report, page 299			$79,450,438.53
Receipts during fiscal year 1914:			
Appropriation warrant—			
No. 9, Aug. 30, 1913	$484,541.30		
No. 12, Sept. 30, 1913	424,927.33		
No. 14, Sept. 30, 1913	2,165.97		
No. 19, Oct. 31, 1913	143,807.35		
No. 21, Nov. 15, 1913	91,081.72		
No. 25, Nov. 30, 1913	69,233.67		
No. 27, Nov. 30, 1913	21,840.43		
No. 30, Dec. 31, 1913	66,764.38		
No. 32, Dec. 31, 1913	3,923.04		
No. 37, Jan. 31, 1914	273,761.02		
No. 38, Feb. 28, 1914	22,796.11		
No. 48, Mar. 31, 1914	141,447.22		
No. 50, Mar. 31, 1914	2,347.85		
No. 58, Apr. 25, 1914	46,733.10		
No. 59, Apr. 25, 1914	515,188.73		
No. 62, May 29, 1914	308,852.89		
No. 65, June 30, 1914	6,843.39		
Less auditor's settlement Feb. 20, 1914	633.66		
			2,625,621.84
Special reclamation fund, reimbursable, act of June 25, 1910 (36 Stat., 835)—			
No. 22, Nov. 21, 1913	500,000.00		
No. 28, Dec. 18, 1913	500,000.00		
No. 35, Jan. 16, 1914	500,000.00		
No. 45, Mar. 3, 1914	1,000,000.00		
No. 56, Apr. 23, 1914	1,000,000.00		
			3,500,000.00
Total			85,576,060.37
Disbursements, 308,774 vouchers, as per Table 7		$96,882,527.61	
Collections, 69,957 vouchers, as per Table 8			12,970,469.57
Balance with Treasurer United States, as per Table 6		249,886.44	
Balance with special fiscal agents		1,151,827.14	
Town sites appropriation credited to projects		262,287.66	
Deferred adjustment by Treasury Department		1.09	
Total		98,546,529.94	98,546,529.94

TABLE 6.—*Balances of reclamation fund with the Treasurer of the United States to June 30, 1914.*

Item.		Appropriation.	Withdrawals.	Balances.
Total and balance end of fiscal year 1913, as per Twelfth Annual Report, page 299, Table 5		$79,450,438.53	$77,358,196.59	$2,092,241.94
Fiscal year 1914:				
Reclamation fund		2,625,621.84	7,707,216.26	510,647.52
Special reclamation fund, reimbursable, act of June 25, 1910 (36 Stat., 835)		3,500,000.00		
Total and balance as per statements of the Treasury Department		85,576,060.37	85,065,412.85	510,647.52
For items in Reclamation Service accounts but not included in above add withdrawals on direct settlements by the auditor	$51,790.06			
Add withdrawals on requisitions	209,000.00			
	260,790.06			
Deduct repayments on direct settlements	28.98			
			260,761.08	260,761.08
Totals		85,576,060.37	85,326,173.93	249,886.44

DISBURSEMENTS, COLLECTIONS, AND TRANSFERS.

TABLE 7.—*Disbursement vouchers paid to June 30, 1914.*

	Quarter ended—	Number of vouchers.	Amount.
Balance from Twelfth Annual Report		273,001	$86,446,087.80
1914	Sept. 30, 1913	8,661	2,627,228.61
	Dec. 31, 1913	9,412	2,680,173.47
	Mar. 31, 1914	8,021	2,171,675.83
	June 30, 1914	9,679	2,957,361.90
Total to June 30, 1914		308,774	96,882,527.61

TABLE 8.—*Collection vouchers collected to June 30, 1914.*

	Quarter ended—	Number of vouchers.	Amount.
Balance from Twelfth Annual Report		31,678	$10,213,030.85
1914	Sept. 30, 1913	8,215	432,509.65
	Dec. 31, 1913	9,936	670,405.52
	Mar. 31, 1914	9,484	893,945.48
	June 30, 1914	10,644	760,578.07
Total to June 30, 1914		69,957	12,970,469.57

TABLE 9.—*Transfer vouchers approved to June 30, 1914.*

	Quarter ended—	Number of vouchers.	Amount.
Balance from Twelfth Annual Report		5,998	$4,547,797.45
1914	Sept. 30, 1913	295	134,179.14
	Dec. 31, 1913	265	123,371.80
	Mar. 31, 1914	328	218,102.62
	June 30, 1914	310	145,427.93
Total to June 30, 1914		7,196	5,168,878.94

INVESTMENT OF THE UNITED STATES IN PROJECTS.

Below is given a statement showing cash disbursed and received on account of the several projects and transfers between projects. The work of the service is grouped under four general heads, as follows: Primary projects, those for which specific allotments of funds are in effect and on which construction is under way; secondary projects, those for which general allotments of funds have been made for all such work as a whole and on which only preliminary studies and surveys have been made to determine their advisability and practicability; Indian irrigation projects; and general accounts, which represent those expenditures that are general in nature and are not directly chargeable to any project when first incurred, but which become a charge against all projects as a part of the general or overhead expenses of the service.

Table 10 gives the voucher transactions and net investments of the United States in the several primary projects to June 30, 1914; Table 11 gives the voucher transactions on Indian irrigation projects and miscellaneous to June 30, 1914.

TABLE 10.—*Voucher transactions and net investments of the United States on primary projects to June 30, 1914.*

State.	Project.	Debits.		Credits.				Net investment.
				Collection vouchers.				
		Disbursement vouchers.	Transfers received.	Miscellaneous.	Water-right charges. Building.	Water-right charges. Operation and maintenance.	Transfers issued.	
Arizona	Salt River	$12,035,032.49	$366,299.31	$2,148,650.55	$100,000.00		$56,008.52	$10,096,672.73
Arizona-California	Yuma	7,232,382.73	194,137.91	327,427.84	143,422.26	$44,345.55	87,648.80	6,823,676.19
California	Orland	643,272.25	38,687.32	45,750.61			4,390.15	631,218.81
Colorado	Grand Valley	1,051,251.11	60,996.64	2,497.54			3,414.61	1,106,335.60
Do	Uncompahgre	5,627,007.73	131,579.04	351,396.62			28,794.84	5,378,395.31
Idaho	Boise	9,566,339.09	325,558.85	402,586.40			90,171.17	9,399,140.37
Do	Minidoka	5,468,222.05	274,544.25	318,878.06	330,926.85	234,460.69	195,188.72	4,663,311.98
Kansas	Garden City	379,899.52	11,546.95	4,541.73	142.50	104.50	10,628.58	376,029.16
Montana	Huntley	1,506,049.72	62,600.45	69,043.06	240,862.37	81,633.38	159,607.38	1,017,503.98
Do	Milk River	1,759,565.47	107,585.98	23,318.47			22,778.53	1,821,054.45
Do	St. Mary storage	765,411.13	108,810.53	20,755.20			43,775.95	809,690.51
Do	Sun River	1,543,743.92	114,725.72	35,972.53	92,375.35	34,202.91	46,013.56	1,449,905.29
Montana-North Dakota	Lower Yellowstone	3,216,493.41	98,147.51	42,647.22	33,830.55	35,791.44	31,857.65	3,170,514.06
Nebraska-Wyoming	North Platte	6,071,027.80	633,597.96	84,473.65	183,595.10	251,436.36	19,037.53	6,166,083.12
Nevada	Truckee-Carson	5,631,438.08	262,960.02	84,677.54	235,290.54	136,221.74	36,469.47	5,401,738.81
New Mexico	Carlsbad	1,014,544.76	29,506.90	20,732.42	110,779.30	112,599.89	13,244.85	786,695.20
Do	Hondo	381,703.98	13,354.99	31,914.99			791.52	362,352.46
New Mexico-Texas	Rio Grande	882,743.48	48,655.59	120,198.87			23,863.45	787,336.75
Do	Elephant Butte storage	2,014,586.83	152,510.35	142,356.85			45,205.30	1,979,535.03
North Dakota	North Dakota pumping	983,080.51	193,454.11	36,396.03	6,682.13	12,966.80	182,657.64	937,832.02
Oklahoma	Lawton	450.65						450.65
Oregon	Umatilla	1,793,817.93	58,241.24	62,433.17	187,387.16	58,732.45	85,139.07	1,458,367.32
Oregon-California	Klamath	2,590,963.31	71,109.24	49,143.86	266,691.00	108,945.23	31,484.49	2,205,807.97
South Dakota	Belle Fourche	3,359,098.98	85,330.65	82,013.60	108,113.86	91,103.87	37,229.60	3,125,968.70
Utah	Strawberry Valley	2,421,881.49	87,801.45	141,492.39			32,803.87	2,335,386.68
Washington	Okanogan	739,715.79	28,515.10	71,820.94	24,471.70	35,492.62	10,259.21	626,186.42
Do	Yakima—Sunnyside	2,881,354.50	121,210.86	89,747.11	592,335.15	442,335.19	69,050.95	1,809,096.96
Do	Yakima—Tieton	2,968,549.75	574,048.29	73,416.48	191,089.75	123,493.79	296,350.36	2,858,247.66
Do	Yakima—Storage	1,313,252.47	144,859.13	36,047.64			19,616.22	1,402,447.74
Wyoming	Shoshone	4,285,328.42	150,617.07	153,186.41	210,463.84	91,961.47	48,513.87	3,931,819.90
Total		90,128,209.35	4,550,393.41	5,073,517.78	3,058,459.41	1,895,827.88	1,731,995.86	82,918,801.83

TABLE 11.—*Voucher transactions and net investments of the United States on secondary projects to June 30, 1914.*

State and project.	Debits.		Credits.		Net investment.
	Disbursement vouchers.	Transfers received.	Collection vouchers.	Transfers issued.	
Arizona:					
Little Colorado	$9,515.33	$40.00	$1.00	.....	$9,554.33
San Carlos	24,589.74	252.67	12.90	.....	24,829.51
San Pedro	2,423.72	3.97	.35	.....	2,427.34
Arizona-California:					
Colorado River	42,235.20	7,160.38	760.32	$4,925.26	43,710.00
Colorado River Basin	33.25	.....	.....	.....	33.25
California:					
Owens Valley	25,957.91	121.00	14,016.99	.....	12,061.92
Sacramento Valley	52,548.13	3,008.07	91.79	11,843.69	43,620.72
San Joaquin	3,448.92	82.48	.20	.....	3,531.20
Iron Canyon Cooperative	11,000.02	2,717.00	6,429.53	521.46	6,766.03
Colorado: White River	4,348.04	9.11	.15	.....	4,357.00
Idaho:					
Dubois	21,464.03	834.98	1.81	5,068.29	17,228.91
Port Neuf	2,165.77	2.24	.....	.....	2,168.01
General investigations	349.10	.....	.....	.....	349.10
Montana:					
Clark Fork	5,417.71	433.67	.25	269.90	5,581.23
Crow Reservation	21,029.47	5.01	1.90	2,120.62	18,911.96
Lake Basin	7,044.39	79.87	.....	21.00	7,103.26
Madison River	10,795.45	2.57	1.85	67.08	10,729.09
Marias	13,878.31	93.30	1.55	632.20	13,337.86
Nebraska:					
South Platte	1,913.96	963.05	.....	.....	2,877.01
Nebraska investigations	240.74	.....	.....	.....	240.74
Nevada: Walker River	12,450.48	53.15	.....	.....	12,503.63
New Mexico:					
La Plata	29,598.20	168.55	1,702.42	.....	28,064.33
Las Vegas	5,012.16	2.23	.30	.....	5,014.09
Urton Lake	19,330.65	273.71	1,225.51	914.15	17,464.70
North Dakota:					
Bismarck	16,709.04	26.69	14.70	3,099.34	13,621.69
Little Missouri	11,631.54	1,743.05	1.25	1,439.82	11,933.52
Nesson	7,491.51	29,786.35	4.14	19,801.89	17,471.83
Washburn	9,950.70	1,973.89	42.38	1,350.68	10,531.53
Bowman	3,649.46	1,512.97	556.80	1,091.09	3,514.54
Oklahoma:					
Cimarron	11,680.91	668.59	.....	156.55	12,192.95
Red River	59,413.75	1,902.64	161.77	945.35	60,209.27
Oregon:					
Malheur	82,592.87	4,294.28	279.80	3,116.73	83,490.62
Central Oregon	43,014.03	1,749.04	1,353.58	3,063.08	40,346.41
Columbia River Power	4,539.70	4,703.45	.....	3,111.35	6,131.80
Oregon Cooperative	12,857.37	8,785.54	132.22	3,523.39	17,987.30
Texas: Pecos River	1,617.90	163.32	.....	.....	1,781.22
Utah:					
Bear Lake	18,859.06	30.72	62.06	.....	18,827.72
Utah Lake	34,044.67	9.25	4.62	.....	34,049.30
Washington:					
Benton	11,167.45	.....	31.20	.....	11,136.25
Kittitas	19,366.90	.....	.....	.....	19,366.90
Wapato	36,445.06	20.71	.....	.....	36,465.77
Palouse	76,558.48	360.91	126.38	400.00	76,393.01
Palouse Cooperative	5,342.03	2,238.33	.....	375.44	7,204.92
Priest Rapids	6,218.98	247.58	250.55	.....	6,216.01
Wyoming:					
De Smet	9,053.32	2.51	39.55	98.90	8,917.38
Total	808,995.41	76,526.83	27,309.82	67,957.26	790,255.16

TABLE 12.—*Voucher transactions and net investments of the United States on Indian irrigation and miscellaneous to June 30, 1914.*

Item.	Debits.		Credits.		Net Investment.
	Disbursement vouchers.	Transfers received.	Collection vouchers.	Transfers issued.	
Indian irrigation:					
Blackfeet project	$882,098.18	$94,932.01	$849,101.95	$64,887.26	$63,040.98
Flathead project	1,385,907.76	78,835.85	1,305,152.34	23,712.57	135,878.70
Fort Peck project	371,216.50	38,383.11	334,577.25	12,612.71	62,409.65
Total	2,639,222.44	212,150.97	2,488,831.54	101,212.54	261,329.33
Miscellaneous:					
General expense	2,282,127.72	119,183.09	22,794.79	2,330,636.25	47,879.77
Preliminary investigations		80,488.73			80,488.73
Jackson Lake enlargement	143,103.06	72,567.15	401,902.43	464.56	[1] 186,696.78
Closed accounts	880,869.63	57,568.76	1,825.92	936,612.47	
Total	3,306,100.41	329,807.73	426,523.14	3,267,713.28	[1] 58,328.28

[1] Credit balance, work being performed for benefit of private irrigation projects and paid for in advance.

A recapitulation of Tables 10, 11, and 12 follows:

TABLE 13.—*Recapitulation and verification of voucher transactions and all net investments of the United States from the reclamation fund to June 30, 1914.*

Item.	Debits.		Credits.			Net investment.
	Disbursement vouchers.	Transfers received.	Collection vouchers.		Transfers issued.	
			Miscellaneous.	Water-right charges.		
Primary projects	$90,128,209.35	$4,550,393.41	$5,073,517.78	$4,954,287.29	$1,731,995.86	$82,918,801.83
Secondary projects	808,995.41	76,526.83	27,309.82		67,957.26	790,255.16
Indian irrigation	2,639,222.44	212,150.97	2,488,831.54		101,212.54	261,329.33
Miscellaneous	3,306,100.41	329,807.73	426,523.14		3,267,713.28	[1] 58,328.28
Total	96,882,527.61	5,168,878.94	8,016,182.28	4,954,287.29	5,168,878.94	83,912,058.04

[1] Credit balance.

COLLECTIONS.

The two tables below give information as to collections that have been made under the reclamation operations. Table 14 gives an analysis of the sources of all cash collections to June 30, 1914, and Table 15 gives, by projects, the amount returned for water-right charges.

TABLE 14.—*Analysis of cash collections by fiscal years to June 30, 1914.*

Sources.	1903–1913	1914	Total.
Miscellaneous sales	$852,076.54	$491,195.58	$1,343,272.12
Miscellaneous services	3,131,127.01	920,083.38	4,051,210.39
Temporary water rentals	1,730,472.14	518,143.43	2,248,615.57
Transportation refunds	245,512.97	14,951.89	260,464.86
Forfeitures by bidders and contractors	78,568.71	20.00	78,588.71
Water-right construction charges	2,806,779.77	251,679.64	3,058,459.41
Water-right operation and maintenance charges	1,335,867.86	559,960.02	1,895,827.88
Overdisbursements	32,625.85	1,404.78	34,030.63
Total	10,213,030.85	2,757,438.72	12,970,469.57

TABLE 15.—*Collection of water-right charges by projects to June 30, 1914.*

State and project.	Construction charges.	Operation and maintenance charges.	Total.	Refunds.	Net total collections.
Arizona: Salt River	$100,000.00		$100,000.00		$100,000.00
Arizona-California: Yuma	143,422.26	$44,345.55	187,767.81		187,767.81
Idaho: Minidoka	330,926.85	234,460.69	565,387.54	$252.10	565,135.44
Kansas: Garden City	142.50	104.50	247.00	247.00	
Montana:					
Huntley	240,862.37	81,633.38	322,495.75	401.86	322,093.89
Sun River	92,375.35	34,202.91	126,578.26	881.82	125,696.44
Montana-North Dakota: Lower Yellowstone	33,830.55	35,791.44	69,621.99		69,621.99
Nebraska-Wyoming: North Platte	183,595.10	251,436.36	435,031.46	146.40	434,885.06
Nevada: Truckee-Carson	235,290.54	136,221.74	371,512.28	252.00	371,260.28
New Mexico: Carlsbad	110,779.30	112,599.89	223,379.19		223,379.19
North Dakota: North Dakota Pumping	6,682.13	12,966.80	19,648.93	153.00	19,495.93
Oregon: Umatilla	187,387.16	58,732.45	246,119.61	72.55	246,047.06
Oregon-California: Klamath	266,691.00	108,945.23	375,636.23	204.00	375,432.23
South Dakota: Belle Fourche	108,113.86	91,103.87	199,217.73		199,217.73
Washington:					
Okanogan	24,471.70	35,492.62	59,964.32	52.50	59,911.82
Yakima—					
Sunnyside	592,335.15	442,335.19	1,034,670.34	2,417.05	1,032,253.29
Tieton	191,089.75	123,493.79	314,583.54	762.60	313,820.94
Wyoming: Shoshone	210,463.84	91,961.47	302,425.31	1,444.54	300,980.77
Total	3,058,459.41	1,895,827.88	4,954,287.29	7,287.42	4,946,999.87

The three tables that follow give for the Rio Grande Dam appropriation information similar to that appearing in Tables 5 to 8, inclusive, with corresponding titles for the reclamation fund:

TABLE 16.—*Special appropriation for Rio Grande (Engle) Dam (34 Stat., 1357) to June 30, 1914.*

	Debit.	Credit.
Appropriation warrant No. 79, Mar. 4, 1907		$1,000,000.00
Disbursements, 2,896 vouchers	$1,000,091.78	
Collections, 24 vouchers		91.78
Total	1,000,091.78	1,000,091.78

TABLE 17.—*Balances of appropriations for Rio Grande (Engle) Dam with Treasurer of the United States, June 30, 1907, to June 30, 1914.*

Fiscal year.	Appropriation.	Withdrawals.	Balances.
1907	$1,000,000.00		$1,000,000.00
1908		$33,113.21	966,886.79
1909		137,074.22	829,812.57
1910		247,217.23	582,595.34
1911		327,875.96	254,719.38
1912		214,052.49	40,666.89
1913		39,165.89	1,501.00
1914		1,501.00	
Total	1,000,000.00	1,000,000.00	

TABLE 18.—*Disbursement and collection vouchers, appropriation for Rio Grande (Engle) Dam, paid and collected to June 30, 1914.*

	Disbursement vouchers.		Collection vouchers.	
	Number.	Amount.	Number.	Amount.
Balance from Twelfth Annual Report	2,895	$998,590.78	24	$91.78
June 30, 1914	1	1,501.00		
Total	2,896	1,000,091.78	24	91.78

RECLAMATION DEPOSIT ACCOUNT.

Below is a statement of receipts, payments, and balances, and a list of the items making up the final balance to June 30, 1914. A description of the nature of the account appears on page 51 of the Tenth Annual Report.

TABLE 19.—*Receipts and payments from reclamation deposit account during fiscal year 1914.*

Dates.	Receipts.	Payments.	Balance.
Balance on hand June 30, 1913	[1] $48,500.00		
July, 1913	7,200.00	$30,800.00	$24,900.00
August, 1913	5,700.00	5,500.00	25,100.00
September, 1913	12,500.00	29,600.00	8,600.00
October, 1913	3,150.00	8,600.00	3,150.00
November, 1913	23,200.00	24,050.00	2,300.00
December, 1913	27,800.00	17,900.00	12,200.00
January, 1914	44,000.00	15,800.00	40,400.00
February, 1914	43,400.00	24,400.00	59,400.00
March, 1914	6,540.60	37,400.00	28,540.00
April, 1914	42,337.15	21,000.00	49,877.15
May, 1914	120,020.00	23,677.15	146,220.00
June, 1914	44,700.00	137,770.00	53,150.00
Total	429,047.15	375,897.15	53,150.00

[1] See Twelfth Annual Report, p. 304, Table 16.

Outstanding checks, June 30, 1914.

No.	Date.	Bidder.	Amount.
207	Apr. 13,1914	S. W. Portland Cement Co	$5,000
288	June 11,1914	Adelbert Cazier	800
289	.....do.....	J. E. Hilton	900
298	June 23,1914	Best Manufacturing Co	3,000
300	.....do.....	Union Iron Works	3,000
301	.....do.....	Exeter Machine Works	6,000
302	.....do.....	Wm. Cramp & Sons Ship & Engine Building Co	3,000
303	.....do.....	Westinghouse Machine Co	3,000
304	.....do.....	Joshua Hendy Iron Works	3,000
305	.....do.....	Pelton Water Wheel Co	3,000
306	.....do.....	Nordberg Manufacturing Co	3,000
307	.....do.....	Seattle Construction & Dry Dock Co	3,000
310	.....do.....	Washington Iron Works Co	1,500
312	.....do.....	Minneapolis Steel & Machine Co	3,000
313	.....do.....	Fulton Engine Works	3,000
315	.....do.....	Westinghouse Machine Co	500
316	.....do.....	James O'Connor	800
317	.....do.....	Dooling Bros	700
318	.....do.....	C. F. O'Neill	700
319	.....do.....	Brown & Leahy	700
320	.....do.....	Russel Condon	700
321	.....do.....	Chas. Wilhite & Co	700
322	.....do.....	Winston Bros. Co	700
323	.....do.....	Heuser & Simm	700
324	.....do.....	A. L. Markhus	700
325	.....do.....	Hoy & Johnson	700
326	.....do.....	Tebbs, Taggart, Jurgens & Knipe	700
327	.....do.....	MacArthur Bros. Co	700
329	.....do.....	Monighan Machine Co	200
331	.....do.....	Marion Steam Shovel Co	200
334	June 30,1914	Platt Iron Works Co	3,000
335	.....do.....	Albert Hawkins	850
		Total	57,450
		Amount due bidders	53,150
		Treasury balance	110,600

Amounts held pending award of contracts and deposits to guarantee payments under contracts.

Bids opened.	For—	Bidder.	Amount.
May 9, 1914	Excavation of distribution system, Orland project.	W. H. Mason	$850
May 11, 1914	Electrical apparatus, Okanogan project	Nixon-Kimmel Co	500
Do	do	Pittsburgh Transformer Co	500
Do	do	Crocker-Wheeler Co	500
Do	do	Westinghouse Electric & Manufacturing Co.	500
Do	do	General Electric Co	500
Do	do	Allis-Chalmers Co	500
Do	do	Wagner Electric Manufacturing Co	500
Do	Hydraulic apparatus, Okanogan project	The Pelton Water Wheel Co	500
Do	do	S. Morgan Smith Co	500
Apr. 27, 1914	Tile drains, Huntley project	Nowell-Atherly Co	500
Do	do	Hugh McDonald	300
Do	do	Frank Savaresy	300
Do	do	Emanuel Lindstrom	1,000
May 20, 1914	Earthwork and structures, Vandalia Canal, second unit, Milk River project.	Security Bridge Co	300
Do	do	Threet Bros. & Jolly	300
Do	do	C. F. O'Neill	500
Do	do	A. L. Markhus	800
Do	do	Temple & Siroky	500
Do	do	Dooling Bros	500
Do	do	James O'Connor	800
Do	do	Tebbs, Taggart, Jurgens & Knipe	500
May 18, 1914	Excavation and structures, St. Mary Canal, Milk River project.	Condon & Williams	3,200
May 20, 1914	Gates, Clear Creek Dam, Yakima project.	Hinman Hydraulic Manufacturing Co.	50
Do	do	Coldwell-Wilcox Co	50
Do	do	Vulcan Iron Works	50
Do	do	Coffin Valve Co	50
May 28, 1914	Construction of Three-Mile Falls diversion works, Umatilla project.	Jacobsen-Bade Co	2,000
Do	do	Pacific Bridge Co	2,000
Do	do	Morrison-Knudsen Co	2,000
Do	do	Bates & Rogers Construction Co	2,000
Do	do	J. H. Tillman Co	2,000
Do	do	Reliance Construction Co	2,000
Do	do	Chamberlain Construction Co	2,000
Do	do	Graff Construction Co	2,000
Do	do	Andrus & Bode	2,000
Do	do	Newport Land & Construction Co	2,000
May 29, 1914	Tile drains, Huntley project	Security Bridge Co	500
May 27, 1914	Earthwork and structures, Vandalia South Canal, Milk River project.	I. J. Denton	1,500
Do	do	Heuser & Sim	1,900
Do	do	Threet Bros. & Jolly	1,500
Do	do	Security Bridge Co	1,500
Do	do	W. J. Hoy	1,500
May 21, 1914	Centrifugal pumps, Okanogan project.	Chas. C. Moore & Co	150
Do	do	Perine Machine Co	150
Do	do	Geo. B. Adair & Son Co	150
Do	do	C. F. Braum & Co	150
Do	do	The Pelton Water Wheel Co	150
Do	do	Byron Jackson Iron Works	150
Do	do	Henry B. Worthington	150
June 10, 1914	Earthwork and structures, Dodson South Canal, Milk River project.	A. L. Markhus	1,500
Do	do	Chas. Wilhite & Co	500
Do	do	Querry & Davis	500
Do	do	Dooling Bros	500
Do	do	James O'Connor	500
Do	do	Snelson Bros	150
Do	do	C. F. O'Neill	500
Do	do	Heuser & Sim	1,500
Do	do	Tebbs, Taggart, Jurgen & Knipe	500
Do	do	Temple & Siroky	500
Do	do	Security Bridge Co	1,000
	Guaranty deposits	Magma Copper Co	1,000
	Total		53,150

TABLE 20.—*Assets, liabilities, reserves, and capital, Washington and detached offices, to June 30, 1914.*

ASSETS.

Cash in fiscal agent's possession awaiting remittance			$35.17
Accounts receivable, uncollected miscellaneous			227.75
Inventories:			
Mechanical and other equipment		$38,892.78	
Material and supplies on hand in storehouse		32,025.44	
Undistributed cost (freight and handling)		752.36	
		71,670.58	
Less unadjusted transfers between projects		1,996.97	
			69,673.61
Construction work in process:			
Undistributed expenses to date		2,772.29	
Less revenue earned as follows—			
Rental of telephones	$348.24		
Revenues, miscellaneous	1,834.33		
Adjustments, depreciation on plant and equipment	8,765.37		
Total deductions		10,947.94	
Over distribution of expenses to projects			8,175.65
Total assets			61,760.88

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		4,548.72	
Unpaid purchases		4,293.67	
Unpaid freight and express		67.77	
Unpaid passenger fares		2,837.39	
Unpaid miscellaneous		2,133.56	
			13,881.11
Net investment:			
Disbursements	$2,282,127.72		
Transfers received from other projects	119,183.09		
		2,401,310.81	
Less—			
Collections	22,794.79		
Transfers issued to other projects	2,330,636.25		
		2,353,431.04	
			47,879.77
Total liabilities, reserves, and capital investment of the Government			61,760.88

Undistributed expenses of Washington office and detached offices, to June 30, 1914.

Balance of cost ledger to June 30, 1914	$2,154.00
Cost ledger inventories	618.29
Gross undistributed cost to date	2,772.29

Estimated expenditures of Washington office for fiscal year 1915.

Salaries	$225,000.00
Per diem and traveling expenses	10,500.00
Passenger transportation	13,940.00
Equipment (furniture and fixtures, etc.)	10,345.00
Storehouse supplies for issue to projects	57,059.00

Storehouse supplies for local use	$86,500.00
Rental of offices	10,500.00
Telephone and telegraph service	9,000.00
Heat, light, and power	1,800.00
Miscellaneous	5,356.00
Total	350,000.00

TABLE 21.—*Assets, liabilities, reserves, and capital, secondary projects, to June 30, 1914.*

ASSETS.

Accounts receivable, uncollected miscellaneous items			$249.89
Inventories, mechanical and other equipment			8,840.18
Construction work in process:			
Gross preliminary expenses of projects to date		$867,273.96	
Rentals of grazing lands	$31.20		
Profits on hospitals	4.00		
Adjustments, depreciation on plant and equipment	568.74		
Total deductions		603.94	
Net construction expenses of projects to date			866,670.02
Total assets			875,760.09

LIABILITIES, RESERVES, AND CAPITAL.

Accounts payable:			
Unpaid labor		2,935.63	
Unpaid purchases		1,655.11	
Unpaid freight and express charges		109.66	
Unpaid passenger fares		315.80	
Total			5,016.20
Net investment:			
Disbursements	$808,995.41		
Transfers received from other projects	157,015.56		
		966,010.97	
Less—			
Collections	27,309.82		
Transfers issued to other projects	67,957.26		
		95,267.08	
Total			870,743.89
Total liabilities, reserves, and capital investment of the Government			875,760.09

Cost of secondary projects to June 30, 1914.

[Miscellaneous preliminary investigations.]

Arizona:	
Little Colorado	$9,554.33
San Carlos	24,829.51
San Pedro	2,427.34
Arizona-California:	
Colorado River	43,710.00
Colorado River Basin	33.25
California:	
Owens Valley	12,061.92
Sacramento Valley	43,620.72
San Joaquin	3,531.20
Iron Canyon Cooperative	6,650.31
Colorado, White River	4,357.00
Idaho:	
Dubois	17,228.91
Port Neuf	2,168.01
General investigations	349.10

Montana:		
Clark Fork		$5,581.23
Crow Reservation		18,911.96
Lake Basin		7,103.26
Madison River		10,729.09
Marias		13,337.86
Nebraska:		
South Platte		2,877.01
Nebraska investigations		240.74
Nevada, Walker River		12,503.63
New Mexico:		
La Plata		28,064.33
Las Vegas		5,014.09
Urton Lake		17,464.70
North Dakota:		
Bismarck		13,621.69
Little Missouri		11,933.52
Nesson		17,471.83
Washburn		10,531.53
Bowman		3,514.54
Oklahoma:		
Cimarron		12,192.95
Red River		60,209.27
Oregon:		
Malheur		83,490.62
Central Oregon		40,346.41
Columbia River power		5,836.68
Oregon Cooperative		14,237.64
Texas, Pecos River		3,060.09
Utah:		
Bear Lake		18,827.72
Utah Lake		34,049.30
Washington:		
Benton		11,167.45
Kittitas		19,366.90
Wapato		36,465.77
Palouse		76,393.01
Palouse Cooperative		6,585.42
Priest Rapids		6,216.01
Wyoming:		
De Smet		8,917.38
Miscellaneous preliminary investigations		80,488.73
Total		867,273.96

Estimated cost of contemplated work on secondary projects during the fiscal year 1915.

Arizona-California: Colorado River Basin investigation		$49,966.75
California:		
Iron Canyon Cooperative investigations		1,734.13
Pitt River investigations		2,500.00
Idaho: General investigations		650.90
Nebraska: General investigations		9,759.26
Oregon:		
Columbia River power investigations		6,163.32
Oregon Cooperative project:		
Carriage	$248,000.00	
Distrubution	42,000.00	
Telephone lines	3,500.00	
Roads and bridges	1,000.00	
Miscellaneous preliminary investigations	73,141.32	
Operation and maintenance during construction	1,000.00	
		368,641.32
Texas: Pecos River investigations		1,414.82
Total		440,830.50

RECLAMATION ORGANIZATION.

ADMINISTRATIVE ORGANIZATION OF THE SERVICE.

The following order was issued by the Secretary of the Interior on December 13, 1913:

The United States Reclamation Service shall on and after this date be constituted of five divisions, to be known and designated as follows:

1. Scientific, Statistical, and Historical Division.
2. Engineering and Technical Division.
3. Law Division.
4. Fiscal and Accounts Division.
5. Operation and Maintenance Division.

Subject to the approval of the Secretary of the Interior, the control, direction, and management of the service shall hereafter be vested jointly in the following officers:

1. The director.
2. The chief engineer.
3. The chief counsel.
4. The comptroller.
5. The supervisor of irrigation.

The officers named shall constitute a board for the purpose of considering all questions of administrative policy and management, and recommending action thereon, to the Secretary of the Interior, but no act of said officers or of said board shall be of force or effect unless the same is in pursuance of authority previously given by the Secretary of the Interior. For convenient reference said board shall be known as the reclamation commission.

The director shall have charge of the scientific, statistical, and historical division and shall—

1. Be chairman of the commission.
2. Have general oversight of the Reclamation Service.
3. Direct and conduct all explorations and preliminary surveys of proposed reclamation projects.
4. Direct and conduct all scientific and experimental work in connection with the service not otherwise provided for.
5. Direct and conduct the collection of statistics relating to all branches of the service.
6. Direct and conduct the compilation and publication of all documents and reports covering the activities of the service.
7. The jurisdiction of the director shall include all engineers, engineering boards, or other experts of the service engaged in explorations, preliminary surveys, scientific, experimental, and research work, all of whom shall report to and be governed by the director.

The chief engineer shall have charge of the engineering and technical division and shall—

1. Be the adviser of the commission in all matters concerning the feasibility of all proposed projects and as to the construction and installation of project works.
2. Direct and conduct all final surveys of proposed reclamation projects.
3. Direct and conduct all engineering operations appertaining to the construction and installation of all necessary water storage, diversion, distribution, irrigation, drainage, power generating, and transmission works.
4. Direct and conduct all construction operations undertaken by the service.
5. Direct and conduct all necessary scientific, experimental, and research work connected with the construction and installation of project works.
6. The jurisdiction of the chief engineer shall include all engineers and engineering boards or other experts or employees of the service engaged in final surveys and construction work on approved projects, all of whom shall report to and be governed by the chief engineer.

The chief law officer shall hereafter be known as the "chief counsel," and shall have charge of the legal division, and shall—

1. Be the legal adviser of the commission and the Secretary of the Interior on questions affecting the Reclamation Service.

2. Direct and conduct all investigations involving the legal rights and privileges of the Reclamation Service.

3. The jurisdiction of the chief counsel shall include all employees of the legal division, and the so-called "legal examiners" shall hereafter be known and designated as "district counsel" or "assistant district counsel," as the chief counsel may direct, except all those in the legal division in the Washington office, who shall be known by such titles as the chief counsel may hereafter direct. All employees of the legal division shall report to and be governed by the chief counsel.

The comptroller shall have charge of the fiscal and accounts division, and shall—

1. Be the adviser of the commission on all questions concerning finances and accounting.

2. Direct and conduct the keeping of all necessary records and accounts to cover all of the activities and operations of the service.

3. Direct and control the expenditure of the reclamation fund, and the purchase and distribution of all materials and supplies.

4. The jurisdiction of the comptroller shall extend to and include all employees of the service engaged in the keeping of accounts, the purchase and distribution of materials and supplies, the disbursement and collection of funds, and all clerical employees, all of whom shall report to and be governed by the comptroller.

The supervisor of irrigation shall have charge of the operation and maintenance division and shall—

1. Be the adviser of the commission on all matters concerning irrigated lands.

2. Direct and conduct the management, operation, and maintenance of the irrigation systems on all of the projects operated by the service.

3. Advise and counsel with water users and water users' associations as to the best methods and practice of irrigation, and as to the cultivation of irrigated lands, the development of markets for the products thereof, and all questions affecting the welfare of settlers and water users.

4. Consult and cooperate with the experts of the Agricultural Department assigned to each of the projects.

5. The jurisdiction of the supervisor of irrigation shall extend to and include all project managers and other employees engaged in the maintenance and operation of the irrigation systems, who shall report to and be governed by the supervisor of irrigation.

GENERAL OFFICES.

Hon. Franklin Knight Lane, Secretary of the Interior.

Brig. Gen. William L. Marshall, United States Army, retired, consulting engineer to the Secretary.

The following five officials of the Reclamation Service constitute a board or commission for the purpose of considering all questions of administrative policy and management, and recommending action thereon to the Secretary of the Interior:

Frederick Haynes Newell, director, Washington, D. C.

Arthur Powell Davis, chief engineer, Washington, D. C.

Will R. King, chief counsel, Washington, D. C.

W. A. Ryan, comptroller, Washington, D. C.

I. D. O'Donnell, supervisor of irrigation, 206 State Bank Building, Billings, Mont.

WASHINGTON OFFICE.

Office of the director: C. J. Blanchard, statistician.

Office of the chief engineer: Frank Teichman, E. C. Bebb, and E. A. Moritz, engineers; John H. Pellen, draftsman.

Office of the chief counsel: Morris Bien, counsel; J. M. McKinney, C. A. Mansuy, O. G. Cowhick, E. B. Hoffman, D. H. Sibbett, H. L. Holgate, and R. M. Patrick, examiners; Mrs. G. B. Fowler, assistant examiner; Mrs. E. W. Ballard, clerk.

Office of the comptroller: H. P. Seidemann, chief accountant; C. G. Smith, examiner of accounts; E. G. Paul, chief clerk; C. G. Duganne, fiscal agent.

FIELD OFFICES.

Office of the supervisor of irrigation: Robert C. Elting, chief clerk, Billings, Mont.

O. H. Ensign, chief electrical engineer, 605 Federal Building, Los Angeles, Cal.; J. M. Gaylord and C. E. Hogle, engineers.

W. W. Follett, consulting engineer, 414 El Paso & Southwestern Building, El Paso, Tex.

D. C. Henny, consulting engineer, 1005 Spalding Building, Portland, Oreg.

L. C. Hill, consulting engineer, 1112 Hollingsworth Building, Los Angeles, Cal.

Joseph Jacobs, consulting engineer, Seattle, Wash.

J. H. Quinton, consulting engineer, 1112 Hollingsworth Building, Los Angeles, Cal.

W. H. Sanders, consulting engineer, 915 Grand View Avenue, Los Angeles, Cal.

A. J. Wiley, consulting engineer, Boise, Idaho.

D. W. Murphy, engineer in charge of drainage, 602 Federal Building, Los Angeles, Cal.

C. E. Harris, acting transportation agent, 777 Federal Building, Chicago, Ill.

P. M. Fogg, engineer on field investigation, Pecos, Tex.

I. C. Harris, engineer in charge of inspection of materials, 802 Federal Building, Chicago, Ill.

J. Y. Jewett, cement expert, 408 Commonwealth Building, Denver, Colo.

SOUTHERN DIVISION.

ARIZONA, NEW MEXICO, TEXAS, UTAH, CALIFORNIA.

F. W. Hanna, supervising engineer, Phoenix, Ariz.; S. B. Taggart, chief clerk.

Salt River project.—C. H. Fitch, project manager, Phoenix, Ariz.; Oro McDermith, assistant project manager; Walter Ward, engineer; W. S. Cone, superintendent of construction, power division; J. L. Clancy, district counsel; W. P. Marine, chief clerk; D. K. Clint, fiscal agent.

Yuma project.—F. L. Sellew, project manager, Yuma, Ariz.; J. F. Richardson, engineer; A. N. Kelley, irrigation manager; J. R. Stilson, chief clerk and fiscal agent.

Rio Grande project.—L. M. Lawson, project manager, El Paso, Tex.; F. Teichman, designing engineer; H. J. Gault and J. D. Stannard, engineers; P. W. Dent, district counsel; F. S. Cundiff, chief clerk; E. G. McCoy, fiscal agent.

Elephant Butte Dam.—E. H. Baldwin, construction engineer, Elephant Butte, N. Mex.; L. J. Charles, assistant engineer; A. McD. Brooks, chief clerk; J. C. Gawler, fiscal agent.

Carlsbad and Hondo projects.—L. E. Foster, project manager, Carlsbad, N. Mex.; C. A. May, assistant project manager; V. L. Minter, chief clerk and fiscal agent.

Strawberry Valley project.—J. L. Lytel, project manager, Provo, Utah; E. E. Roddis, district counsel; J. L. Segall, chief clerk and fiscal agent.

PACIFIC DIVISION.

CALIFORNIA, OREGON, NEVADA.

E. G. Hopson, supervising engineer, 202 Central Building, Portland, Oreg.; O. P. Morton and E. S. Taylor, district counsel.

Orland project.—A. N. Burch, project manager, Orland, Cal.; C. H. Lillington, chief clerk and fiscal agent.

Truckee-Carson project.—D. W. Cole, project manager, Fallon, Nev.; F. G. Hough, chief clerk; J. R. Post, fiscal agent.

Lahontan Dam.—F. H. Tillinghast, engineer, Lahontan, Nev.; L. G. Maney, superintendent of construction; H. N. Bickel, principal clerk.

Umatilla project.—H. D. Newell, project manager, Hermiston, Oreg.; Maurice Scroggs, superintendent of irrigation; C. W. Kellogg, chief clerk and fiscal agent.

Klamath project.—J. G. Camp, project manager, Klamath Falls, Oreg.; B. E. Hayden, assistant engineer, operation and maintenance; C. C. Hogue, chief clerk and fiscal agent.

Cooperative work in Oregon and California.—John T. Whistler, engineer in charge, 215 Central Building, Portland, Oreg.

Columbia River power project.—L. F. Harza, project manager, First National Bank Building, The Dalles, Oreg.

NORTHERN DIVISION.

MONTANA, NORTH DAKOTA, WYOMING.

H. N. Savage, supervising engineer, Great Falls, Mont.; W. J. Egleston, district counsel; C. P. Williams, engineer.

Blackfeet project.—C. J. Moody, project manager, Browning, Mont.; C. E. Frisbee, chief clerk; G. H. Baird, fiscal agent.

Flathead project.—E. F. Tabor, project manager, St. Ignatius, Mont.; S. G. Swigart, irrigation manager; W. H. Meglasson, principal clerk; T. W. Hause, fiscal agent.

Fort Peck project.—R. M. Conner, project manager, Poplar, Mont.; Frank Nivens, chief clerk and fiscal agent.

Huntley project.—R. H. Fifield, project manager, Huntley, Mont.; E. B. Le Claire, chief clerk and fiscal agent.

Milk River project.—W. W. Schlecht, project manager, Malta, Mont.; G. E. Stratton, engineer, Glasgow, Mont.; H. W. Bruen, chief clerk; C. B. Mauser, fiscal agent, Malta, Mont.

St. Mary storage unit.—Joseph Wright, engineer, Fletcher, Mont.; C. E. Frisbee, chief clerk; G. H. Baird, fiscal agent, Browning, Mont.

Sun River project.—R. M. Snell, project manager, Fort Shaw, Mont.; Augustine H. Ayers, engineer; C. A. Peavey, chief clerk; H. T. Caldwell, fiscal agent.

North Dakota pumping project.—W. S. Arthur, chief clerk and fiscal agent, Williston, N. Dak.

Lower Yellowstone project.—L. H. Mitchell, project manager, Savage, Mont.; C. H. Young, chief clerk; R. M. Reid, fiscal agent.

Shoshone project.—G. O. Sanford, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; C. E. Piatt, chief clerk; A. L. Erickson, fiscal agent.

CENTRAL DIVISION.

COLORADO, KANSAS, OKLAHOMA, SOUTH DAKOTA, NEBRASKA, WYOMING.

R. F. Walter, supervising engineer, 519 Commonwealth Building, Denver, Colo.; A. R. Honnold, district counsel; J. J. Buck, assistant district counsel; J. A. Dolphin, chief clerk and fiscal agent.

Grand Valley project.—J. H. Miner, project manager, Grand Junction, Colo.; O. T. Reedy, engineer; E. R. Mills, chief clerk; A. L. Collins, fiscal agent.

Uncompahgre Valley project.—F. D. Pyle, project manager, Montrose, Colo.; J. H. Fertig, assistant engineer; J. R. Alexander, district counsel; T. W. Zimmerman, chief clerk; E. R. Furstenfeld, fiscal agent.

North Platte project.—Andrew Weiss, project manager, Mitchell, Nebr.; Paul Rothi, irrigation manager; O. P. Burrows, chief clerk; M. T. Murray and J. R. Ummel, fiscal agents.

Pathfinder Dam.—H. D. Comstock, assistant engineer, Mitchell, Nebr.

Belle Fourche project.—F. C. Magruder, project manager, Newell, S. Dak.; R. B. Smith, chief clerk; T. E. Jones, fiscal agent.

IDAHO DIVISION.

IDAHO, OREGON, WYOMING.

F. E. Weymouth, supervising engineer, Boise, Idaho; B. E. Stoutemyer, district counsel; F. L. Cavis, chief clerk; S. E. Hedden, fiscal agent.

Boise project (distribution unit).—G. H. Bliss, project manager, Boise, Idaho; F. T. Crowe, construction engineer, in charge of work in Pioneer irrigation district.

Boise River storage unit.—C. H. Paul, construction engineer, Arrowrock, Idaho; James Munn, superintendent of construction; A. B. Mayhew, engineer; R. R. Clawson, principal clerk.

Minidoka project.—H. M. Schilling, project manager, Rupert, Idaho; F. N. Cronholm, superintendent of construction; C. A. Lyman, chief clerk; N. K. Jensen, fiscal agent.

Minidoka power and pumping stations.—Barry Dibble, engineer, Minidoka, Idaho.

Jackson Lake enlargement project.—F. A. Banks, engineer, Moran, Wyo.; J. M. Luney, chief clerk; R. W. Miller, fiscal agent.

WASHINGTON DIVISION.

WASHINGTON.

C. H. Swigart, supervising engineer, North Yakima, Wash.; E. W. Burr, district counsel; Floyd Foster, chief clerk; R. K. Cunningham, fiscal agent.

Okanogan project.—Calvin Casteel, project manager, Okanogan, Wash.; H. A. Yates, chief clerk and fiscal agent.

Yakima project:

Storage unit.—C. E. Crownover, project manager, Meadow Creek, Wash.; R. R. Ruhnke, chief clerk; W. W. Davis, fiscal agent.

Sunnyside unit.—R. K. Tiffany, project manager, North Yakima, Wash.; J. G. Heinz, assistant manager, Sunnyside, Wash.; J. S. Moore, assistant engineer; E. M. Philebaum, chief clerk and fiscal agent.

Tieton unit.—R. K. Tiffany, project manager, North Yakima, Wash.; G. C. Finley, assistant manager, Naches, Wash.

Palouse project.—Ernest McCulloh, engineer, Sunnyside, Wash.; Miss L. S. Dickinson, chief clerk and fiscal agent.

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DISTRIBUTION OF EMPLOYEES.

Employees, June, 1914.[1]

	Government employees.				Contractor's force.	Grand total.	
	Educational.	Registered.	Others.	Total.		Projects.	Division.
Washington office[2]	93	.....	7	100	.....	100	
Billings office	2	.....	.....	2	.....	2	
Chicago offices	16	.....	.....	16	.....	16	
Denver office (cement)	2	6	.....	8	.....	8	
Los Angeles offices	13	.....	.....	13	.....	13	
							139
Southern division office	3	.....	.....	3	.....	3	
Salt River project	22	130	350	502	.....	502	
Yuma project	10	75	750	835	.....	835	
Colorado River storage	1	1	.....	2	.....	2	
Carlsbad project	3	11	56	70	13	83	
Hondo project	.....	1	7	8	.....	8	
Rio Grande project	21	51	94	166	.....	166	
Elephant Butte	14	107	1,009	1,030	.....	1,130	
Pecos Valley investigations	1	.....	.....	1	.....	1	
Strawberry Valley	9	18	28	55	.....	55	
							2,785
Pacific division office	6	.....	.....	6	.....	6	
Orland project	5	14	13	32	96	128	
Truckee-Carson project	15	64	237	316	.....	316	
Umatilla project	9	24	149	182	.....	182	
Klamath project	6	16	40	62	1	63	
California cooperative work	3	2	.....	5	.....	5	
Oregon cooperative work	2	6	18	26	.....	26	
Columbia River cooperative work	1	.....	6	7	.....	7	
							733
Northern division office	10	2	.....	12	.....	12	
Blackfeet project	7	14	66	87	.....	87	
Flathead project	14	30	45	89	38	127	
Fort Peck project	7	13	198	218	.....	218	
Huntley project	9	11	111	131	.....	131	
Milk River project	19	20	128	167	141	308	
St. Mary storage	12	6	30	48	270	318	
Sun River project	21	26	43	90	271	361	
North Dakota pumping	3	6	37	46	.....	46	
Lower Yellowstone project	5	19	53	77	.....	77	
Shoshone project	7	29	110	146	.....	146	
							1,831
Central division office	5	.....	.....	5	.....	5	
Garden City project	.....	.....	1	1	.....	1	
Uncompahgre Valley project	13	54	100	167	10	177	
Oklahoma investigations[3]	.....	.....	.....	.....	.....	.....	
North Platte project	15	77	107	199	130	329	
Nebraska investigations	1	1	4	6	.....	6	
Belle Fourche project	7	34	107	148	38	186	
Grand Valley project	13	43	272	328	40	368	
							1,072
Idaho division office	4	1	.....	5	.....	5	
Boise:							
Distribution unit	27	99	89	215	.....	215	
Storage unit	10	224	846	1,080	.....	1,080	
Minidoka project	19	125	318	462	.....	462	
Jackson Lake enlargement	7	26	139	172	.....	172	
Snake River storage	.....	.....	.....	.....	.....	.....	
							1,934
Washington division office	9	3	1	13	.....	13	
Okanogan project	4	8	25	37	.....	37	
Yakima storage unit	20	30	375	475	.....	475	
Sunnyside unit	9	27	15	51	.....	51	
Yakima, Tieton unit	5	29	83	117	10	127	
Washington cooperative work (Palouse)	2	20	9	31	.....	31	734
Total June, 1914	541	1,553	6,076	8,170	1,058	9,228	9,228
Total June, 1913	478	1,207	4,926	6,611	1,005	7,616	7,616
Increase, 1914	63	346	1,150	1,559	53	1,612	1,612

[1] Aside from the projects under construction or operation, there are eight independent engineering investigations under way.

[2] Exclusive of 6 consulting engineers employed at intervals.

[3] One engineer transferred to Pecos Valley work in February.

INJURIES TO EMPLOYEES.

Statement of injuries to employees of the United States Reclamation Service reported under the act of May 30, 1908.

Project.	Injuries reported.						Claims allowed.						Compensation paid.[2]						
	1908[1]	1909	1910	1911	1912	1913	1908	1909	1910	1911	1912	1913	1908	1909	1910	1911	1912	1913[3]	Total.
Salt River	9	15	9	11	7	7	5	11	6	8	6	2	$2,322.25	$4,138.00	$4,397.01	$1,919.25	$798.00	$1,794.50	$15,369.01
Yuma	18	7	43	46	51	13	9	4	20	27	26	6	2,180.80	191.38	2,711.84	2,424.93	10,740.79	1,591.55	19,841.29
Orland	1	1	1	0	0	14	1	0	0	0	0	11	613.00	.....	.....	.....	.....	.....	613.00
Klamath	1	7	0	2	4	0	1	5	0	0	2	0	78.00	1,378.81	.....	306.48	172.63	.....	1,935.92
Grand Valley	0	0	0	0	8	44	0	0	0	0	3	16	.....	.....	.....	.....	177.92	1,466.88	1,644.80
Uncompahgre	3	40	28	11	8	12	1	29	21	6	1	7	30.00	5,462.24	11,698.45	1,468.79	62.33	1,333.92	20,055.73
Minidoka	0	7	10	5	7	2	0	5	9	6	2	2	.....	854.85	2,588.25	253.75	1,066.70	99.00	4,862.55
Boise	0	6	11	66	118	97	0	6	6	10	76	71	.....	991.63	547.13	2,403.66	17,035.09	8,612.27	29,589.78
Snake River Storage	0	1	11	16	0	0	0	1	9	4	0	0	.....	859.50	1,629.18	280.38	.....	720.44	3,489.50
Garden City	0	3	0	0	0	0	0	1	0	0	0	0	.....	77.46	.....	.....	.....	.....	77.46
Blackfeet	0	5	3	3	2	3	0	2	1	2	1	2	.....	282.50	1,417.90	.....	52.20	195.85	1,948.45
Flathead	0	2	5	14	9	9	0	1	3	5	5	3	.....	110.50	555.25	1,541.38	481.11	316.91	3,005.15
Fort Peck	0	0	0	2	0	0	0	0	0	0	0	0	.....	.....	.....	.....	.....	.....	.....
Huntley	0	2	0	0	2	1	0	0	0	0	2	1	.....	.....	.....	.....	77.50	72.50	150.00
Milk River	0	6	6	0	3	5	0	5	3	0	1	1	.....	721.10	581.77	.....	47.10	29.60	1,389.57
St. Mary Storage	0	0	0	2	4	7	0	0	0	0	0	6	.....	.....	49.87	316.58	.....	445.43	811.88
Sun River	0	1	1	0	0	14	0	1	1	0	0	6	.....	209.44	456.32	.....	.....	1,592.00	2,257.76
Lower Yellowstone	2	20	3	0	9	2	2	8	1	0	2	1	1,066.44	1,277.91	733.00	.....	145.12	129.94	3,352.41
North Platte	1	3	7	8	17	6	0	3	3	7	10	5	.....	320.28	1,071.60	2,676.66	3,367.37	213.48	7,649.39
Truckee-Carson	0	0	0	7	15	11	0	0	0	3	9	8	.....	.....	.....	314.95	2,266.45	860.40	3,441.80
Carlsbad	0	0	0	0	1	0	0	0	0	0	1	0	.....	.....	.....	.....	33.00	.....	33.00
Rio Grande	2	1	0	54	94	78	1	1	0	20	41	35	63.75	23.44	.....	1,049.70	2,465.71	2,958.00	6,560.60
North Dakota Pumping	6	2	5	1	0	7	1	1	2	1	0	0	30.00	199.99	123.51	601.21	.....	.....	954.71
Belle Fourche	3	0	1	4	1	4	1	0	1	3	0	0	790.40	.....	208.00	192.36	.....	.....	1,190.76
Strawberry Valley	3	15	14	33	54	7	0	1	4	12	21	4	.....	1,090.50	626.60	4,512.88	4,136.56	226.25	10,592.79
Okanogan	1	3	0	0	0	0	1	2	0	0	0	0	270.00	90.75	.....	.....	.....	.....	360.75
Yakima	11	24	36	39	28	41	8	8	9	13	9	22	2,228.65	1,055.45	2,013.77	3,773.77	750.88	1,728.73	11,551.25
Shoshone	1	2	8	4	17	19	1	2	2	2	12	8	126.25	178.50	134.35	140.40	3,685.85	611.59	4,876.94
	62	173	202	328	459	403	32	97	101	129	230	217	9,799.54	19,514.23	31,543.80	24,177.13	47,562.31	25,009.24	157,606.25

[1] From Aug. 1 to Dec. 31, 1908.
[2] Payments do not include cost of hospital and medical services, or subsistence, or cost of employment of other persons in place of those injured.
[3] Payments not completed for injuries received in 1913.

ENGINEERING ARTICLES RELATING TO THE WORK OF THE SERVICE.

The following is a partial list of engineering articles relating to the work of the Reclamation Service as published in engineering and technical journals. The list is printed for the information of engineers and others interested in the work, and is a continuation of the list printed on pages 353 to 364 of the twelfth annual report:

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